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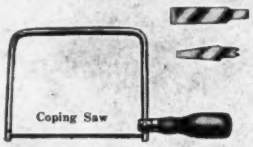
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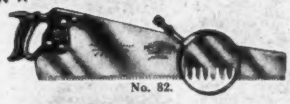
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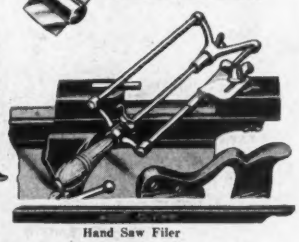
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No. 6

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June,
1925

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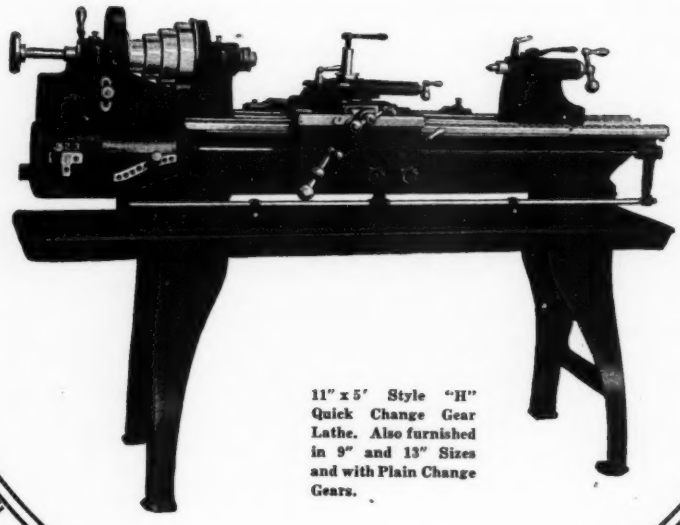

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THE INDUSTRIAL ARTS MAGAZINE

Volume XIV JUNE, 1925 No. 6

The Permanence of the Vocational Choices of High School Pupils

H. B. Alberty, Ohio State University

THERE has been much discussion in recent years as to the practical value of the vocational choices of high school pupils. A great deal of the debate has centered around the all-important problem of their permanence. This study aims to present data which may be of value in finding the solution to that problem. It deals principally with the ninth, tenth, eleventh and twelfth grade pupils of the fifteen high schools of the Cuyahoga County (Ohio) School District.

This school district is located in the northeastern part of Ohio and comprises the territory of Cuyahoga county with the exception of the city of Cleveland and other exempted cities and villages. It contains about 350 square miles of territory, with a population of about sixty thousand and a school enrollment of eleven or twelve thousand. The local districts vary in character from the typically rural district like Royalton to the typically city district like Shaker Heights.[1] The great diversity makes the county an ideal one for a study of this kind.

1. The Method

The study was begun in March, 1922, at which time all the pupils from the seventh to the twelfth grades, inclusive, were asked to fill out a vocational inquiry card. The question with which this phase of the study is concerned was worded as follows: "What do you wish to do to earn your living when you have finished school? Give reasons for your choice."[2] In order to make sure that the data would be comparable, complete instructions to both teachers and pupils were worked out. These were first taken up with the administrative heads of the various districts and later with the teachers who supervised the filling out of the cards. The cards were given to the pupils without previous announcement and with no opportunity for them to consult with either the teacher or the other pupils. There were no comments by the teachers, except as provided for in the instructions.

In March, 1923, exactly one year after the original inquiry, cards containing the same question were filled out by the pupils. No mention was made to the pupils of the fact that these cards were similar to those which they had previously filled out. This course was followed in order to make sure that the pupil would not try to answer as he had the previous year. Through correspondence the second year choices of the pupils who had graduated were also secured.

Exactly the same procedure was followed in March, 1924, except that the study was limited to the pupils of the four upper years of the high schools in 1922. Since two of these classes had graduated, as many of the former pupils as possible were reached by correspondence.

2. Summary of Original Data

In 1922 the study involved 1468 boys and 1507 girls. Only a brief summary of the results of the first year's study is here included. Here are a few of the outstanding facts which were discovered.

1. Ninety and three-tenths per cent of the pupils made a vocational choice.

2. Engineering proved to be the most popular vocation for boys. This choice was made by eighteen per cent of the boys.

3. Thirty per cent of the girls named teaching as their intended vocation.

4. Forty-three per cent of the boys and 53 per cent of the girls named professional occupations.

5. A total of seventy vocations were selected by the boys but only sixteen were chosen by one per cent (fifteen) or more.

6. Only 36 different vocations were listed by the girls. Twelve vocations were named by one per cent (fifteen) or more of the girls.

In 1923 the study involved 1037 boys and 1110 girls; the results of this first check-up have been combined with the data gathered in 1924.

3. Are High School Pupils Interested in Vocations?

To those who are inclined to think that high school pupils are not interested in vocations, it should be of interest to note that in practically all the studies which have been made, a large percentage of the pupils actually named a vocation. The following table gives the results of some of these studies:

[1] Since this study was begun Shaker Heights has withdrawn from the county district.

[2] The statement of this question is the same as that used by Dr. T. C. McCracken in a study made in Cincinnati several years ago.

STUDY	Per Cent of Pupils Who Failed to Choose Some Occupation: Boys	Girls
New York. (Van Denberg, 1906) eighth grade only	41.0	55.0
Cincinnati Public Schools. Grades 9-12. (McCracken, 1920)	17.4	15.1
Indiana High Schools. (Book, 1921) Seniors only	36.0	40.0
Cuyahoga County. Grades 7-12 (1922)	9.6	9.7
Baltimore Public Schools. Grade 7B. (Franklin, 1924)	.7	.9

The study in Cuyahoga County seems to indicate that, in general, the assurance as to life careers becomes somewhat less pronounced as the pupil advances. This seems especially true in the case of the boys. In the seventh grade, 94 per cent of the boys named a vocation, but in the twelfth grade this percentage had fallen to 81. This condition probably is as it should be because, if education functions as real growth, it should constantly open new vistas and develop conflicting interests. As the pupil comes face to face with the problem of choosing a life career, he realizes its seriousness.

The following table gives the status of the pupils after the two-year period:

Table 2

		Boys 9	10	11	12	Total	Girls 9	10	11	12	Total	Grand Total
Grade												
Number cases		123	92	50	61	326	148	88	58	59	353	679
1. Pupils who chose a vocation at the time of each of the inquiries.	No.	84	60	33	32	200	125	65	41	47	278	487
	Pct.	68	65	66	52	61	84	74	71	79	78	72
2. Pupils who chose a vocation at the time of two of the inquiries.	No.	27	17	9	19	72	14	13	14	8	49	121
	Pct.	22	18	18	31	22	9	15	24	14	14	18
3. Pupils who chose a vocation at the time of only one of the inquiries.	No.	12	14	7	8	41	8	9	3	4	24	65
	Pct.	10	15	14	13	13	5	10	5	7	7	10
4. Pupils who were undecided at the time of each of the three inquiries.	No.	0	1	1	2	4	1	1	0	0	2	6
	Pct.	0	1	2	3	1	1	1	0	0	0	1

It will be noted that the number of cases involved in the study is given at the top of the table. This represents all of the pupils of the grades indicated for whom data were available for each of the three inquiries. The grades indicated are as of 1922, when the original inquiry was made. It will also be noted that the percent of pupils who named a vocation is very much lower than those indicated in the previous table. This is due to the fact that no pupil is included in Group 1 who was undecided at the time of any one of the three surveys. Groups 2, 3, and 4 are analyses of the remaining pupils. Attention is called to the fact that 487 pupils (72 per cent) were decided at the time of all the inquiries, and that only six pupils (one per cent) were undecided at the time of all of the inquiries. The table indicates that about three pupils out of ten were undecided at least once during the two-year period. In every grade the girls show a higher degree of stability than the boys.

4. How Permanent are the Vocational Choices of High School Pupils?

Very little satisfactory data are available upon the question, yet a number of studies have been made which throw some light upon it. One of these was made by A. R. Crathrone[3] of the University of Illinois. He studied a group of over two thousand freshmen in widely scattered institutions. Among other questions he asked the students this one: "If on the day you entered high school, you had been asked what you expected to do as your life work, what would have been your answer?" The results indicated that 57 per cent of the students had at the time of entering high school decided upon a vocation. Of these about half were still holding to their original choices.

Proctor and Ward[4] also present a very interesting study of the permanence of vocational interests. It is the result of a follow-up four years after data concerning the vocational plans of the pupils had been collected. A total of 771 pupils originally filled out the questionnaires. After four years 683 pupils were distributed as follows: (a) In occupations, 272. (b) In educational institutions beyond the high school, 290. (c) Still in high school, 33. (d) Married, 47. (e) Just graduated, plans indefinite, 27. (f) Prevented from carrying out plans by ill health, 10. (g) Died, 4. Out of the 272 pupils who were engaged in occupations, 87 were engaged in occupations selected four years previously. In other words, more than thirty per cent held to their original high school choices.

Dr. E. E. Franklin[5] made a study of the Seven B pupils of a number of the junior high schools of Baltimore, and found that from December, 1922, to December, 1923, during which period three follow-ups were made, there was a percentage of permanency of 58.2 for the boys and 72.7 for the girls.

McCracken and Lamb[6] in several studies, found that in the seventh grade there was a permanency percentage of 56.6 for the boys and 46 for the girls. In grades nine to twelve the percentage for the boys was 53.8 and for the girls, 57.6. This study was for a period slightly over a year, in which time three follow-ups were made.

Table 3

Showing the permanence of vocational choices at the end of one year and also at the end of the two year period

1922 Grade	Pupils Holding Same Choice—1923 (1) Total No.	(2) No.	(3) Pct.	Pupils Holding Same Choice—1924 (4) Total No.	(5) No.	(6) Pct.	(7) Pct. Undec.	(8) Pct. Change
Ninth Grade—								
Boys	219	94	43	123	35	28	32	40
Girls	226	113	50	148	56	38	16	46
Total	445	207	46	271	91	34	22	44

[3]Crathrone, A. R.: Educational Administration and Supervision, May-June, 1920.

[4]Proctor and Ward: Journal of Educational Research, April, 1923.

[5]Franklin: Permanence of the Vocational Interests of Junior High School Pupils. Johns Hopkins University Studies in Education, No. 8.

[6]McCracken and Lamb: Occupational Information in the Elementary School.

Tenth Grade—								
Boys	155	73	47	92	20	22	35	43
Girls	135	72	53	88	22	25	26	49
Total	290	145	50	180	42	23	30	47
Eleventh Grade—								
Boys	101	48	48	50	16	32	34	34
Girls	114	61	54	58	20	34	29	37
Total	215	109	51	108	36	33	32	35
Twelfth Grade—								
Boys	78	27	35	61	7	11	48	41
Girls	107	70	65	50	28	47	21	32
Total	185	97	47	120	35	29	35	36
Grand Total—								
Boys	553	242	43	326	78	24	36	40
Girls	582	316	55	353	126	36	22	42
All Pupils..	1135	558	49	679	204	30	28	42

This table deals with the permanence of choice and is based upon *identical* choice, and not permanence within a general occupational group. Column 1 gives the total number of pupils involved in the 1923 inquiry. The percentage of permanence, for 1923, is based upon the total number of pupils involved, and not upon the number who made some vocational choice. For example it will be noted that 49 per cent of all the pupils held to the same vocational choice. In the remaining 51 per cent are included both the pupils who changed and those who were undecided at the time of one or more of the inquiries. Columns 4, 5, and 6 give the results of the 1924 inquiry upon the same basis.

Comparison of the data of this study with that of other studies is rather difficult because of the fact that classifications have been made upon different bases and under different conditions.

In Baltimore, where Franklin made the study previously referred to, the pupils must elect one of three differentiated courses (academic, industrial or commercial) at the beginning of grade Seven A. The study was begun only a short time before the pupils chose their courses. Since very few pupils, according to Dr. Franklin, change their courses, it is not surprising that a relatively high percentage of permanence was found. As proof that the vocational interests of pupils are stable, however, the figures are far from convincing. The figures may suggest that sharp differentiation of courses in the seventh grade tend to limit pupils' vocational horizons and force them to make premature choices. It is scarcely necessary to point out that the basis of classification materially affects the percentage of permanence. In the Baltimore study, all the specific vocational choices were grouped under the following heads: (1) Agriculture; (2) manufacturing; (3) mechanical industries; (4) transportation; (5) trade; (6) public service; (7) engineers; (8) physicians; (9) lawyers and judges; (10) teachers; (11) entertainers; (12) other professional service; (13) domestic and personal service; (14) clerical service. This classification is a modification of that which is used by the Federal Census Bureau, the "Professional Service" group being subdivided into six separate groups. A pupil's choice was regarded as permanent if a change was not made from one group to another. For example, all pupils who chose commercial occupations were classified under "Clerical Service." Changes within this very general group were not taken into consideration. About ten per cent of the choices were classified under the general heading, "Other Professional Service." Pupils who were originally classified in this group may have made entirely different choices in the later inquiries, without affecting the percentage of permanence. It is well, then, before making sweeping conclusions as to the permanence of vocational interests, to be certain that the basis of classification is a valid one.

It will be noted (Table 3) that thirty per cent of the pupils in the Cuyahoga County study were still holding to the identical choices at the end of the two year period. Of the remaining seventy per cent, approximately 28 per cent were undecided at some time during the period. This means that the remaining 42 per cent made changes. What kind of changes did they make? In order to answer this question the pupils' choices were classified into occupational groups. Instead of taking the census classification, or any other rigid grouping as the basis, the writer attempted to classify together those occupational choices which from an examination of the cards seemed to have developed from the same or at least a very similar general interest. The assumption was made that there is a difference between a general vocational interest, and a vocational choice. It is conceivable that a number of specific vocational choices might, with the intellectual progress of the individual, group out of the same general interest.

With these considerations in mind, the following classification was worked out:

Occupational Classification—Boys

Group 1
Aeronautics
Architect
Auto designer
Auto mechanic
Auto racer
Civil engineer
Draftsman
Garage man
Machinist
Marine engineer
Mechanical engineer
Mechanic
Railroad engineer
Structural engineer
Surveyor
Truck driver

Group 2
Battery Repair
Electrical engineer
Electrician
Radio

Group 3
Chemist
Pharmacist

Group 4
Dairy farming
Florist
Forest ranger
Fruit grower
General farming
Horticulture
Landscape architecture
Poultry raising
Stock farmer
Tiling work
Tree surgeon
Truck gardner
Veterinarian

Group 5
Accountant
Advertising
Bookkeeper
Business
Business administration
Commercial
Salesman
Salesmanager

Group 6
Mail Carrier
Railway Mail Clerk

Group 7
Chiropodist
Chiropractor
Dentist
Doctor
Surgeon

Group 8
Minister
Missionary
Salvation Army
Social service

Group 9
Athletic Director
Teacher

Group 10
Cabinetmaker
Carpenter
Contractor
Upholsterer
Steeplejack

Group 11
Artist
Cartoonist
Commercial artist
Illustrator

Group 12
Government inspector
Government official
Politician

Group 13
Marine
Sailor

Group 14 (Unclassified)*
Actor
Arctic explorer
Baseball player
Chef
Dancing teacher
Geologist
Golf teacher
Grocer
Journalist
Lawyer
Musician
Plasterer
Printer
Public speaker

*Changes within this group were classified as major.

Occupational Classification—Girls

Group 1	**Group 5**
Accountant	Governess
Banker	Housework
Bookkeeper	Tea room
General business	**Group 6**
Clerical	Costume designer
Foreign correspondent	Dressmaker
Insurance agent	Milliner
Multigraph operator	**Group 7**
Private secretary	Authoress
Stenographer	Journalist
Group 2	Librarian
Music Teacher	Reporter
Physical Training Teacher	**Group 8**
Teacher	Artist
Group 3	Cartoonist
Missionary	Commercial artist
Social service	Interior decorator
Y. W. C. A. work	**Group 9**
Group 4	Gardening
Dramatics	Florist
Elocution	**Group 10**
Lyceum work	Chemist
Movie star	Dietician
Musician	Doctor
	Nurse

Group 1 (Boys) is an attempt to place together, vocational choices which might grow out of a general "Mechanical Interest." It may seem a far cry from the occupation of "mechanic" to the profession of "civil engineering." However, the average junior high school pupil with little knowledge of either science or mathematics could hardly be expected to know enough about mechanical occupations to make an intelligent choice. Naturally he would know much more of a mechanic's work than of a civil engineer's. As he is introduced to courses in science, mathematics, vocational civics, etc., as well as to a series of "tryout courses," the interest might manifest itself in such a vocational choice as civil engineering.

Group 2 deals with electrical interests, Group 3 with chemical, Group 4 with agricultural, etc., etc. The same underlying principle is involved in each group.

It should be kept in mind that this classification was used only to determine the degree of change. It has nothing to do with the determination of the percentage of permanence (30 per cent) previously referred to.

If a pupil changed only within a particular group, such change was regarded as **minor**, while if he changed from one group to another, such change was regarded as **major**.

It is evident that a classification made upon this basis, while an improvement upon a rigid and arbitrary grouping, falls far short of solving the problem. There are large numbers of exceptional cases, the status of which can only be determined by additional data and by close personal contacts. The following are a few cases which, under the above classification had to be regarded as major changes:

T. A. T. 10th Grade. Age 15. I. Q. 112.
1922 Choice. Electrical Engineer—"Like to be around electrical appliances."
1923 Choice. Chemist—"I like the work."
1924 Choice. Research Chemist—"Best fitted for that work."

V. S. 10th Grade. Age 15. I. Q. 100.
1922 Choice. Art designer—"I am interested in art designing."
1923 Choice. Interior decorator—"Interested in art and color scheming."
1924 Choice. Milliner—"Best fitted for this line of work."

T. W. 9th Grade. Age 16. I. Q. 103.
1922 Choice. Radio—"It is interesting and there is room for advancement."
1923 Choice. Electrical engineer—"Interesting occupation. Not unhealthy."
1924 Choice. Chemist—"One may do a great deal of good in this work."

Did the vocational interests really change or was the same general interest present throughout? There is certainly room for further investigation along this line. If the classification presented does nothing more than to create a suspicion that any classification fails to tell the whole truth as to permanence of interest, it shall have fulfilled its purpose.

Table 4

	Boys	Pct.	Girls	Pct.	Total	Pct.
1. Pupils who named a vocation at each of the three inquiries	209	64	278	78	487	72
A. Held to original choices	78	24	126	36	204	30
B. Made only minor changes during the period	23	7	28	8	51	8
C. Made major changes during the period	108	33	124	34	232	34
2. Pupils who named a vocation at the time of two of the three inquiries	72	22	49	11	121	18
A. Held to original choices	18	6	16	3	34	5
B. Made only minor changes during the period	15	5	7	2	22	3
C. Made major changes during the period	39	12	26	7	65	10
3. Pupils who named a vocation at only one of the three inquiries	41	13	24	7	65	10
4. Pupils who were undecided at time of all three of the inquiries	4	1	2	1	6	1
Total of all pupils	326		353		679	

Group 1 of this table indicates that of the 42 per cent who made changes, eight per cent of the changes were minor and 34 per cent major. If we place the eight per cent who made minor changes in the group of thirty per cent who held to their original choices, our percentage of permanence rises to 38 for the two year period, and if to this group we add the eight per cent in Group 2 who were undecided only once, but who made the same or a similar choice at the time of two inquiries, our percentage of permanence becomes 46. These figures indicate that the socalled "percentage of permanence" depends very largely upon what criteria the investigator uses in determining the meaning of "permanence."

The final test of permanence comes when the pupils actually become settled in their life work. Unfortunately the pupils involved in this study are for the most part either in high school or college. However, the following facts concerning 120 members of the class which graduated from high school in 1922 were secured:

1. Twelve per cent are still undecided as to their life work.

2. Forty-two pupils have had two years of collegiate training, while an additional 25 have had one year of training beyond high school.

3. Forty pupils are actually engaged in their life work. Of this number, fourteen are engaged in the occupation which they selected two years before; twenty have made major changes. Six pupils of this group were undecided two years before.

The data presented may be summarized as follows:

1. The percentage of permanence, after a period of one year was 49. After a period of two years it fell to thirty per cent. If, instead of using specific choices as the basis of classification, a general grouping of occupational choices is employed, the percentage of permanence rises materially. Since different methods of classification have been used in most of the permanence studies which have been reported, data are not comparable.

2. The vocational choices of the girls are somewhat more permanent than those of the boys.

3. There seems to be little or no increase in the percentage of permanence from grade to grade.

4. After the two year period, in which two follow-ups were made thirty per cent of the pupils held to their original choices, eight per cent made only minor changes, 34 per cent made major changes, and 28 per cent were undecided at least once during the period.

While no definite conclusions can be drawn from a study as limited in its scope as this one, yet the data would seem to suggest the following points:

1. Any system of vocational or educational guidance should take into consideration not only the occupational choices of the pupils, but also the general interests from which these choices develop.

2. When we consider the fact that there is little increase in permanence of vocational choices from grade to grade, and that seven pupils out of ten in the four upper years of the high school, either are undecided or make changes in their vocational plans over a two-year period, it appears to be exceedingly doubtful whether vocational choices should be used as the sole basis for the determination of courses of study. It is entirely too simple a solution to assume that because a 12-year-old boy says that he wishes to become a mechanic, he should be immediately shunted into a narrow industrial course leading directly to that vocation. It follows that any educational system that assumes that seventh grade pupils have sufficient background or knowledge to choose wisely either a vocation or a specialized course, is upon rather questionable ground.

3. If these vocational choices are carefully studied, together with all other available data, over a period of years, they are undoubtedly of great value in the hands of a trained advisor, for purposes of vocational and educational guidance. This means, of course, that the school should provide the means for developing broad general interests which have a liberalizing quality. Instead of trying to get the pupil to select a vocation very early in his school career, the school should be primarily concerned about giving the pupil a broad outlook on life and a sympathetic understanding of his world.

The General Shop in the Junior High School

Denman Kelley

(Continued from May)

4. *The General Activity Shop.* Probably more people have this kind of shop in mind than any other when they think of a general shop. Such a shop would be modeled on a general repair or work shop, such as any farmer or mechanic would like to have and a few do have. The idea is to provide a shop where any ordinary type of mechanical construction or repair work can be done. The work might come from these trades principally: woodworking, blacksmithing, sheet metal working, electrical work, automobile and gas engine repair, painting, machine shop work, drafting, plumbing. Other trades, such as agriculture, might furnish some projects. There would be no attempt to equip a shop to do all the work of any one of these trades, but there should be some of the equipment from each, and it should be possible to do construction and repair work involving some of the elements of each of several trades.

As examples of projects in several trades we may consider these:

(a) A radio set. This would involve electrical wiring and theory, cabinet making, soldering, painting or varnishing, and drafting.

(b) A pushmobile. This would vary depending upon the elaborateness of design, but it could well include woodwork, forging, sheet metal, electricity (for horn and lights, machine work (drilling) and drafting.

(c) Repairing an electric iron or motor. This would probably include only electricity, soldering and blue print reading.

(d) Repairing a gasoline engine. This would include gas engine repair and possibly some forging, machine shop, soldering, blue print reading, and electricity, all depending on the nature of the repairs.

These few projects are mentioned as examples of the type of work that might be done in a single shop equipped with tools from various trades. The advantages of such a shop course are particularly those ensuing from a higher development of the interest factor. The boys' interests vary if we can cover a wide field, it is much more probable that we can reach some of these varying interests than if we confine ourselves to well defined trade limits. At the same time the boy is acquiring the skills and information necessary just about as much as he would in the shop rotation plan. Of course he is not becoming a skilled tradesman in any line, nor is this one of the objectives. The acquisition of skill is only a very minor aim; besides the boy will acquire as much skill in such a course as he would in the short time he could devote to any one trade under the rotation plan.

There are several difficulties to be overcome when this type of general shop is used. One is that of equipment. The ultra conservative opponents of such a system have said that it is impossible to have the complete equipment of half a dozen trades all concentrated in one room. The answer is that no sane advocate of general shop ever thought of such a thing.

Let us take a typical equipment as an illustration: Suppose we have a room which has been designed for a wood-working shop and has a fairly elaborate wood-working equipment. There would be benches with the customary bench tools, a bandsaw, one or two wood lathes, and a staining cabinet. Of course there could be some additional mill-room machinery, but not likely nor is it necessary.

Now let us add to this a metal-working lathe, driven from the same motor as the wood lathe if necessary, although individual motors would be preferable. We might have a drill press, although most of the drilling could be done with a hand drill or, in some cases, on the lathe. There would be a forge, an anvil, and some forging tools. A few sheet metal snips and a soldering outfit would do the small amount of sheet

metal work. A liberal assortment of wrenches would be necessary for not only gas engine work, but for many other forms of repairing. For electricity, a wiring board could be installed in one corner for demonstration and practice. It would contain sockets, switches, fuses, a circuit breaker and a resistance box or bank of lamps. Motors, storage batteries and many other pieces of work bench for electrical work could be installed directly under the switchboard. Much of the electrical apparatus could be secured second hand for a very small sum, and yet it would be just as valuable for this work as new and expensive apparatus.

It may be objected that this equipment does not cover a very wide field; it is not necessary for it to do so. In such a shop there could be made projects involving cabinet making, pattern-making, painting, electrical work, machine shop, forging, plumbing, sheet metal and even a very little foundry work. Aluminum castings could be made by melting the metal in a crucible in the forge fire. The flasks could be made in the shop itself. A good example of the use of such a casting would be for wheels on the pushmobile or on a coaster wagon project previously mentioned. These wheels would need to be machined on the lathe and should have rubber tires, making in all a very nice bit of work involving drafting, pattern-making, foundry, machine shop, and general construction.

The most important objection to this kind of shop scheme is from the standpoint of class organization. How shall pupils be handled? If we analyze our subject matter, how are we going to block it out in instructional order? Then how are we going to give a student the operations in the order of difficulty when they do not logically come in that order in the construction of the project?

A good many teachers who have raised these last two questions have been answering them since they began to teach traditional wood-working by the project method. These teachers never heard of Allen and his trade analysis methods until recently, and they are only bringing up the question for the sake of argument. However, it is a question which deserves a better answer than mere equivocation. An analysis should be made of the entire subject matter to be presented in the particular shop at any given time. The average teacher has made the mistake of trying to follow Allen's method too closely and of trying to make trades the block base. Something else must be used, or it may be best to consider the whole course as a single block. The entire list of principles involved that is, the teaching content, should be listed and arranged in difficulty levels. Of course this list would be tentative and subject to revision, because experience shows some mistakes in the listing and second, because projects continually arise involving principles not thought of when the analysis was made. However, such a list of teaching principles serves as a basis for organizing the course. The next thing necessary would be to make a list of a large number of suitable projects, both construction and repair, as could be found. Then all the operations necessary for each project should be listed together with the teaching principles involved. Right at this point it will likely be necessary to revise the list of principles mentioned above for some new and unthought of ones will be sure to appear. Having listed the principles in the order of difficulty and those involved in the operations of each project, it would now be possible to arrange the projects in a progression scale based on the order of difficulty. Of course there would be some projects, the operations of which are in the main simple, but which involve one or two very difficult ones. Such projects may be listed well toward the bottom of the difficulty scale and, when a fairly elementary student attempts them, he can be helped temporarily on the difficult operations by more advanced students. The same thing is also true in reverse. Some projects will be found rather complex involving several rather difficult operations, but at the same time containing a large number of simple ones. Such projects should be listed well up in the difficulty scale. The simple operations will involve practice with an end in view for the advanced student, and some of them may be done for him by elementary students.

In addition to all these operations, it will occasionally be necessary to have the student do some purely practice exercises, in order, to gain proficiency in the applying of a certain principle in performing the operation involved in making his project. Here, however, we have not a mere exercise, but a highly motivated one, because the boy is willing to do the practice work in order to be able to realize his aim, that of making the project. Such exercise work loses its customary objections and becomes a highly valuable part of the educational program. Thus, it will be seen that the projects listed can be grouped largely according to a scale of difficulty levels. It is certain that they can be grouped much more exactly than the traditional wood-working teacher has usually grouped his projects.

This has, I believe, answered two of the questions raised. There remains the most difficult of the three: How to organize for the handling of pupils. To make this clearer let us again take a concrete illustration. Suppose a teacher has three two-hour classes per day with twenty pupils to the class. How is he going to keep twenty pupils busy doing from ten to twenty different projects involving elements of six to eight trades? At first glance this seems an insurmountable obstacle but it is not as difficult as it seems. The traditional wood-working shop has presented much the same situation. An equal number of boys has worked on an equal number of different projects all at the same time, yet the teacher has handled them and in some cases taught

them just a little. The only difference here is that he has projects covering a little wider field than mere woodwork. In the past he has solved this problem by doing a great deal of individual teaching, and this seems to be the solution. Of course, there is plenty of teaching content which can be explained to the class as a whole, or in groups, just as in a wood-working class. The remainder must be explained individually. The lesson sheet plan discussed later may also offer some help.

Another phase of the student-organization problem is how to keep a check on the principles with which each student is familiar. I am indebted to Mr. Luehring of the machine shop department of the Indiana State Normal School for an idea which solves this problem. A sheet is constructed in the first column of which are listed all the principles to be taught during the course. In the second column is a space for operations. In the third is a space for the project. In the fourth is a space for the grade of work which the student does, thus indicating whether he has gained sufficiently from this experience to try a more difficult operation. The instructor should keep such a sheet on file for each boy and keep it checked up-to-date. Thus, he can see at a glance exactly where each boy stands, both as to amount of experience and quality of work.

One other question that has been raised is worthy of careful consideration: How is the teacher to get the boy to select and to show interest in the proper project at any particular stage in his progress? This can be answered in two ways. First, by saying that it is the same problem as the wood-working teacher has been meeting. Some have solved it one way and some another and many have cut the "Gordian knot" by simply compelling the boy to select from a list of projects suitable for his grade. Second, and this is a much better answer, let us turn to a psychological principle set by John Dewey. He says that our thought is determined largely by the stimulation of our environment and by our thought habits. The teacher can only slowly change the boy's thought habits, but he can go a long way in controlling the environmental stimuli. For instance, in a certain school in Indianapolis, some person or persons conceived the idea of pushmobile races modeled on the five hundred mile Memorial day races held in that city. These pushmobile races have been held at the Emerson School for several years. They are held on a Saturday afternoon, and consist of elimination races and a final. Each racer has a driver who is a small boy and a pusher who is one of the larger boys of the school. Practically all the machines are home built. These races have become so popular that for the last two years or more the Sunday papers have carried pictures and feature articles concerning them.

I do not believe the manual training teachers have utilized this interest anywhere, although I may not be correctly informed as to this, but the idea I am trying to convey is evident; a teacher should seize upon such an interest, or better yet, introduce and develop it. He would need to insist upon rules and control. One rule he should be sure to include is that no boy should drive or push anything except a machine built by the racing team.

This is just one example of the manner in which the teacher may control the environmental stimuli. Mr. Edgerton of Madison, Wis., tells of the Rochester junior high school yacht races which follow the same idea as the pushmobile races. Many other illustrations might be given if space permitted. The fundamental idea to be gained in answer to the question with which we started, is that the boy's selection of a project should be spontaneous and as far as practicable, uncontrolled directly; it should be carefully stimulated and controlled indirectly by a skilful and resourceful teacher.

(To Be Concluded)

EXAMPLES OF CEMENT WORK IN THE NORMAL TRAINING SCHOOL AT TERRE HAUTE, IND.

The accompanying photograph shows the results of a five-weeks' course in cement work given at the Indiana Normal Training School, under the direction of Mr. Sylvan A. Yager. The exhibit includes a portion of the more than $200 worth of concrete products turned out by the high school students in five weeks' time.

The high school class is organized and conducted along the line of general shop work, that is, the students participate in six different activities during the year, in place of one as formerly. The students go to each shop in rotation until all the work is completed in each activity.

During the present year, the students have undertaken work in such activities as carpentry, concrete, wood-turning, pattern-making, foundry work, cabinet-making and furniture construction. So far as possible, the work is planned to offer six weeks' instruction in each subject, but this is sometimes reduced in cases where it is deemed necessary.

Th entire collection of bird baths shown in this exhibit will be placed eventually in the yards at the homes of the pupils represented. It is believed the project will create added interest in the improvement of back yards and that it will have a lasting civic value.

The Shop Objectives and the Physical Equipment for Home Mechanics Departments of Continuation Schools

William F. Rasche, Division of Vocational Teacher Training, Milwaukee Vocational School.

(Concluded from May)

The Project House

THE project house is perhaps the outstanding piece of equipment. It is unique in that it is planned to give the boy experiences under real conditions. The house is five feet wide by eight feet long by seven feet high. It has two doors, two door openings without doors, three windows, and a tool locker. It is sided on the outside.

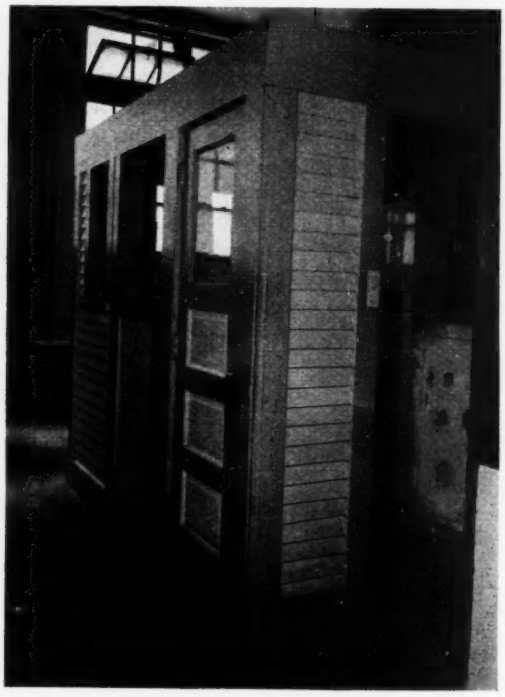


FIGURE 2. A PROJECT HOUSE.

The ceiling inside is open to approximate the overhead conditions of a basement. The walls inside are open but partially cased. Removable panels have been placed in the house for bells and buzzers, fuse and switch boxes, and wall patching. The house is designed to allow the following kinds of work:

1. Two strike plate reset jobs.
2. Three glazing jobs.
3. One wall patching job.
4. Two bell and buzzer jobs.
5. One fuse job.

All of these jobs are done in or at the house with the exception of the three glazing jobs. The actual glazing work, after the sashes have been removed, is done at the work benches. The project house provides work for nine boys altogether.

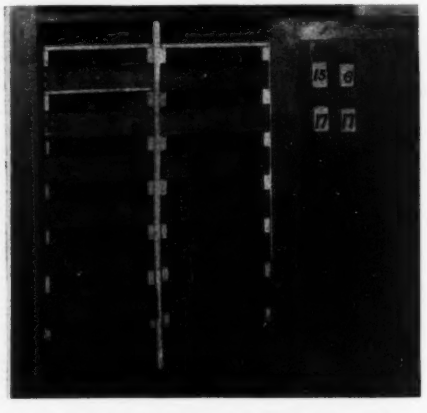
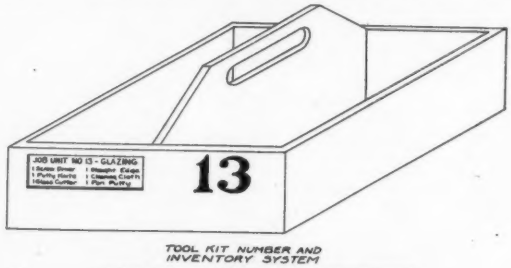


FIGURE 3. A PROJECT HOUSE LOCKER FOR TOOL KITS.

FIGURE 4. AN INDIVIDUAL TOOL KIT.

The Tool Kit Locker

A locker large enough for fourteen tool trays has been built into the house. The space above the locker is open. The top of the locker serves as a writing table on which boys in the house may write notes into their notebooks. Often they put their notebooks here for reference while working on units inside the house.



TOOL KIT NUMBER AND INVENTORY SYSTEM

FIGURE 5. A TOOL KIT INVENTORY.

The tool kits rest on cleats and are placed one above the other in two tiers. On the front end of each kit is the number of the job unit for which the kit is used and a list of the tools and materials that are in the kit.

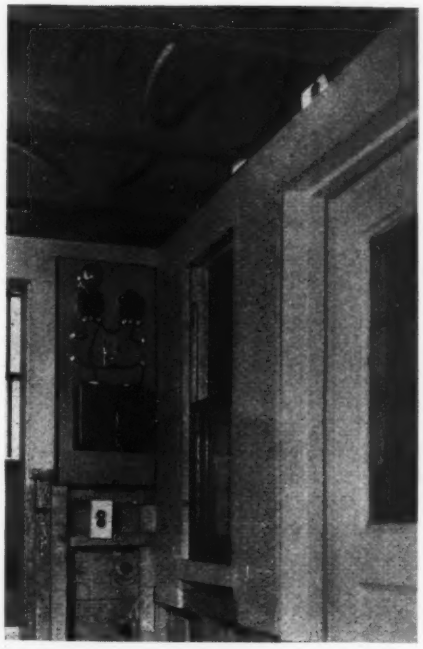


FIGURE 6. A BELL AND BUZZER PANEL.

The kits are arranged to aid the tool checker and the student in the checking of the items. There is a place for everything and a label for each item is pasted to the floor of the tool kit.

The Slip Block Device

The writer devised the slip block to provide an easy means for the replacement of jobs on those parts of the house which would otherwise be ruined were the slip blocks not used. Blocks such as are shown in the illustration are slipped in and out of casing boards and jambs. The ends of these blocks are mitered and fit

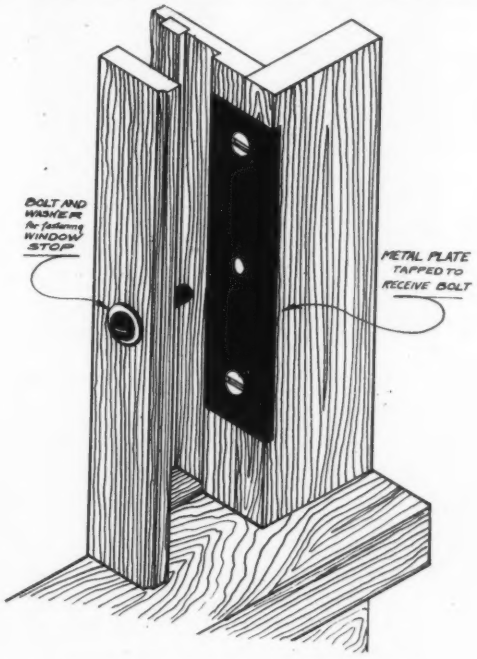
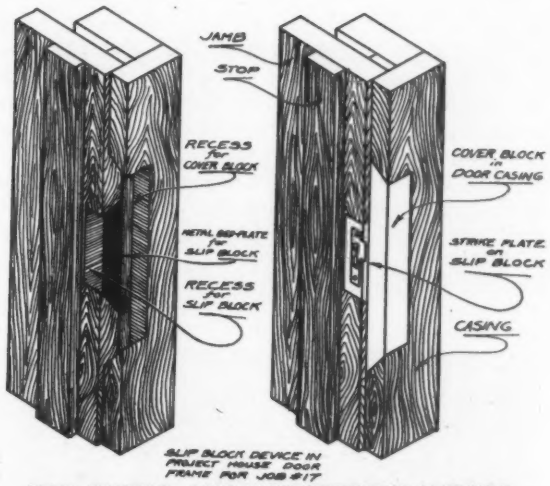


FIGURE 7. PUSH BUTTON SLIP BLOCK.

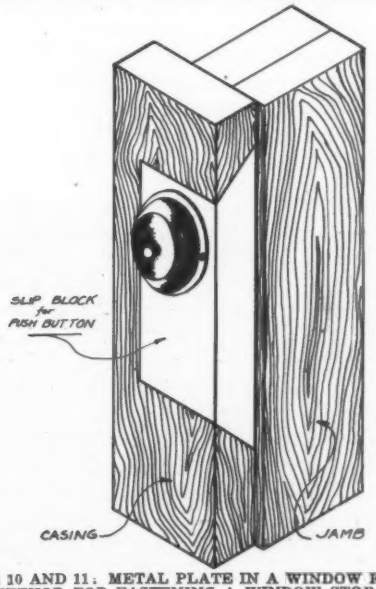

JAMB STOP
RECESS for COVER BLOCK
METAL SUB-PLATE for SLIP BLOCK
RECESS for SLIP BLOCK
COVER BLOCK in DOOR CASING
STRIKE PLATE on SLIP BLOCK
CASING
SLIP BLOCK DEVICE IN PROJECT HOUSE DOOR FRAME FOR JOB #17

LEFT—FIGURE 8. DOOR JAMB WITHOUT SLIP BLOCKS.
RIGHT—FIGURE 9. DOOR JAMB WITH SLIP BLOCKS.

into openings of shapes similar to and of the same size as the blocks. These blocks are used on the project house for the bell and buzzer unit and for the door strike reset unit. They are also used on the hinge and lock unit. The work for the hinge and lock unit is done on a door which is made a part of the battery of storage lockers. The variations of the slip block device for the three units are described under the respective headings that follow.

The Bell and Buzzer Unit

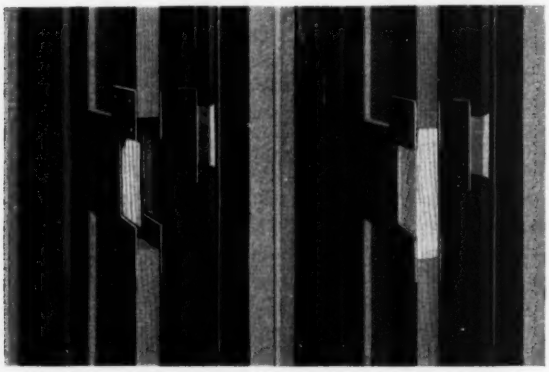
The bell and buzzer unit requires the pupil to make the proper connections for a bell and buzzer circuit. The project house is arranged to permit each of two boys to set up such a circuit simultaneously. One circuit extends the length of the house on one side. The other circuit is on the other side parallel to the first. The push button for the buzzer is mounted at one end of the circuit on a slip block in the outside casing of a door opening. The push button for the bell is mounted similarly on the corresponding slip block on the other end of the house. A bell, buzzer, and battery panel is



FIGURES 10 AND 11. METAL PLATE IN A WINDOW FRAME—METHOD FOR FASTENING A WINDOW STOP.

secured to an end wall directly below the ceiling joists and to the right of the adjacent door opening. The panel for the second circuit is similarly located on the other side and at the other end of the house. The two boys begin and finish their work on opposite ends of the house and so do not interfere with each other.

The trunk wires for the circuit are concealed under trim and cover boards and connect the binding posts on the frames of the door openings to the binding posts on the panel. The pupil's job is to make the proper connections on the panel and at the push buttons, and connect these properly to the binding posts of the trunk wires.



LEFT—FIGURE 12. DOOR WITHOUT A SLIP BLOCK FOR LOCK JOB.
RIGHT—FIGURE 13. DOOR WITH A SLIP BLOCK FOR LOCK JOB.

Red lines on the board covers indicate the locations of the concealed wires. These lines help the pupil to understand the circuit readily even though the trunk wires are concealed. Since the job at home is rarely one of putting up new trunk wires, but rather one of making proper connections and repairing trouble at the buttons and the bells and the buzzers, this unit was so designed that all connections could be made with short wires on the panel board where the principle of the circuit can be demonstrated. Short wires, likewise, are used to connect the push buttons to the nearest binding posts of the trunk wires.

It should be noted here that each slip block may be used twice. The push button is mounted in the upper half of the block. The hole for the wires is drilled through the center of this upper half. When the block is to be used again, it is inverted so the unused half is on the up-side.

Resetting Door Strikes

Door strikes and door latches often get out of adjustment because of the settling of houses. A slip block device has been worked out for strike plate reset jobs. On house door frames adjustments of plates and latches are made by taking the plate off of the jamb and resetting it to another position where it will receive the latch properly. This usually requires a little chiseling of stock in the jamb.

To prevent injury to the door jambs slip block openings have been cut into these jambs to receive blocks on which strike plates have been mounted. Because the jamb of a door is less than one inch thick, metal plates have been screwed to the jamb on the stud side to face the opening and to form a bed for the slip block. The strike plates are so set that the lock latch will not engage the plate. This defect the pupil is required to correct by resetting the plate on the block. The pupil must make this repair when the block is in the jamb. He may not take it to his bench. To keep the block in place another block, permanently attached to a chain, is set into an opening in the outside door casing directly before the slip block in the jamb.

When the pupil has completed the repair job, he is required to take another block, lay out on it the lines for the strike plate according to the directions in the unit instruction sheet, and then chisel out the stock and screw the strike plate into position. The directions call for a layout by which the strike plate is not in the proper position. The boy puts the finished slip block into the door jamb and locks it into place. It is now ready for the next boy to correct.

Glazing

The project house has three window sets. These windows are similar in construction to those in any frame house. The boy who is assigned this unit is required to remove window sash, remove glass from the sash, cut glass, put the new glass into the sash, and put the sash back into the frame. A device has been worked out to facilitate the frequent removal of sash from the frames without injury to the frames or stops. The inside stops are held in place by screws and washers. The screws fit into metal plates in the window frames. These plates are tapped to receive the screws.

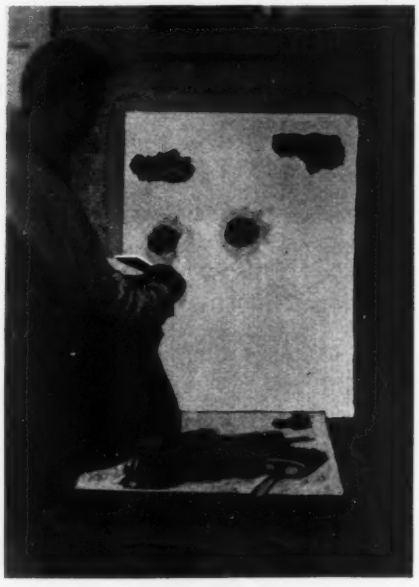


FIGURE 14. A BOY WORKING AT A PLASTER PANEL.

Hinge and Lock Work

Each home mechanics shop has a battery of 27 storage lockers. These are arranged in nine tiers of three lockers each. In a tier near the end of the battery where the light is best, the two lower lockers have been set back about twelve inches to form a recess. To this recess, flush with the plane of the other 25 locker doors, a door for hinge and lock work has been fitted. This door is equipped with two slip blocks which are fastened to metal U plates with screws. Two other slip blocks are fastened to the jambs. One block in the jamb and

FIGURE 15. A FUSE BOX PANEL.

FIGURE 16. EQUIPMENT FOR THE FUSE EXPERIMENT.

the corresponding one in the door form a set for the hinge job. The metal plates that hold the blocks are permanently fastened to the door and the jambs. The boy who is given this job to work out always finds the door in good condition. His first task is to take out the lock and the lower hinge, remove the used slip blocks and put new ones in place. When he has these new blocks fastened to the plates with wood screws, he is ready to do the work in connection with fitting a lock and a hinge.

Sometimes a boy fails to complete a lock job by the time his shop period closes. In that case his lock blocks are slipped out and a reserve block with a door lock fitted in is slipped into place to make it possible to lock the door and have the job ready for the next class.

Wall Patching

A plaster panel made of two by fours, a wood frame, and laths are used for the wall patching job. This panel is removable so the old plaster may be taken off and new put on. The new plaster is put on flush with the surface of the frame. Holes are then broken into

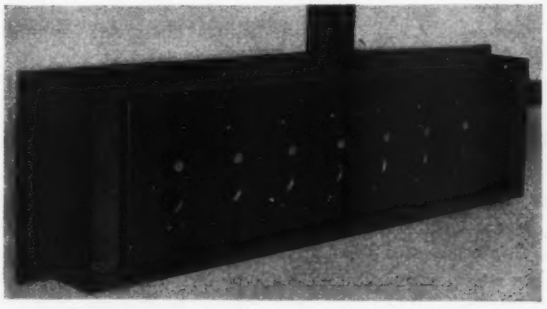


FIGURE 17. A SWITCH BOX FOR THE FUSE EXPERIMENT.

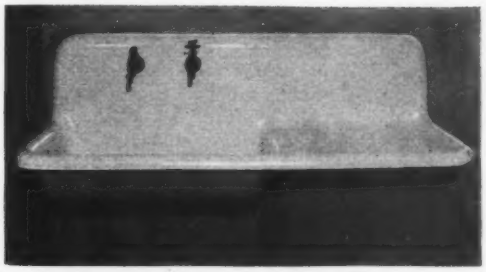


FIGURE 18. A SINK FOR FAUCET REPAIR JOBS.

the plaster. The boy's job is to patch these holes in a workmanlike manner.

Fuses

Each house is equipped with a Square-D switch box and a fuse box. Three circuits are controlled by the fuses in this box. They are for three overhead electric

FIGURE 19. A FAUCET WITH STOP-COCK.

lights. At the point where the three circuits come into the fuse box, the lines are covered by a board fastened to the wall of the house. This board serves a double purpose. The first is to conceal the wires and the other to support the switch and fuse boxes. Because the wires are concealed, the boy is required to test for the circuits.

The fuses are numbered and the outlets are lettered. The instructor inserts two defective fuses in the box. When the boy is assigned to this job, he finds two dead

FIGURE 20. A BOY AT WORK AT THE SOLDERING BENCH.

circuits. His job is to trace out the circuits and determine by test which outlets the several fuses control.

The fuse unit also calls for an experiment to determine the capacity of fuse wires. The purpose of the experiment is to prove the principle that a load increased beyond a given limit will burn out fuses. A boy-proof device has been developed for this purpose. The experiment consists in setting one ampere fuse wire in

FIGURE 21. A BOY GRINDING A TOOL.

single, double, and sometimes treble strands across two binding posts on a feed wire to a bank of lamps set up in a parallel arrangement. To overcome the damage that results to fuses by short-circuiting lines with screw drivers and to lamps by loosening them through too much torsional pressure, a box with seven push button switches and two binding posts was designed to connect with six test lamps and a red pilot lamp mounted on a panel attached to the wall near the ceiling. The lamps

FIGURE 22. AN EXHIBIT CASE.

are controlled independently by push buttons in a plate that covers the entire test box. There is no opportunity for short-circuiting the lines or for screwing lamps in and out of sockets and thus ruining them.

Faucet Repairs

One of the desirable features of a general shop arrangement for home mechanics groups is the small amount of equipment necessary. Nowhere, perhaps, has this been more effective than in the equipment for faucet repairs. At one time schools equipped their shops with factory sinks with overhead supply lines to which were attached enough faucets to accommodate an entire group of pupils. Two distinct disadvantages result from multiple installations. Faucets are easily damaged by the frequent repair work. Many faucets multiply a teacher's responsibilities in the matter of

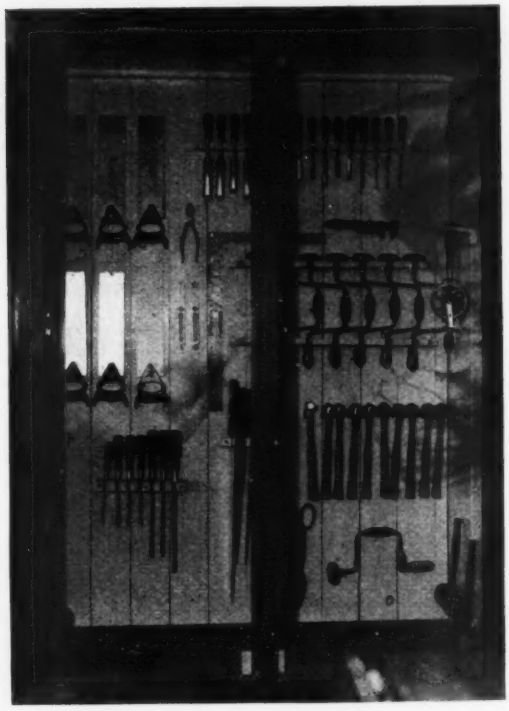


FIG. 23. A TOOL LOCKER.

caring for equipment. Then, too, the concentration of a group of boys about the sinks will cause much disorder because of the splashing and squirting of water.

The better plan is to have a single sink in a suitable place with a compression and a Fuller faucet attached to stop-valves. One boy works at the sink at any one time, and not until he has completed his work should another take his place.

The Soldering and Tool Sharpening Equipment

For reasons similar to those for having but a single set of faucets instead of many set up in a battery, it has been found better to have but one soldering table with a single soldering furnace than to have a multiple equipment. This soldering furnace is located in a central position on top of a metal plate. Near it in a holder is a flux bottle and a jar of dipping solution. Behind the jar is a neatly printed sign placed under glass in a frame with the statement, "Cool Soldering Iron in Water at Wash Basin Before Putting Away."

At one end of the table is a two-wheel motor-driven grinder for sharpening edge tools. Behind it under glass is a sign which has the statement, "Do not Operate Grinder without Goggles." At the other end of the table is an oil stone housed in a metal holder screwed to the table top.

Wood Projects

Each boy is required to make one project out of

FIGURE 24. A WOODWORK BENCH.

wood. Five standard projects have been worked out as wood units from which each boy selects one. If, occasionally, a boy has a project of his own, he is permitted to build it. The range of five projects from which the boy may select is a tool tray, a pantry rack, a flower box, an auto creeper, and a step ladder.

Exhibit Case

To inspire an interest in good workmanship and to give the pupil an idea of what the finished wood project is like, models made by the instructor are housed in glass exhibit cases where they can readily be seen and

FIGURE 25. REFILL CANS.

studied. These cases are made of oak and have sliding doors. They are also equipped with four drawers in which charts for the bulletin board are kept by the instructor.

Tool Storage

The wood working tools are kept in two places. The general tools are stored in a general tool locker. The individual tools are kept in drawers attached to the work benches. These drawers contain four tools, a scale, a marking gauge, a try-square, and a plane.

Work Benches

The work benches are simply constructed. They are equipped with built-up hard wood work tops. To

FIGURE 26. BOYS WORKING AT A BALCONY TABLE.

each bench are attached two vises on opposite sides and at the left ends. Underneath the tops are two individual tool drawers for the individual tools. These drawers are fitted with locks and can be pulled out in opposite directions. The table tops are supported by two metal pedestals. It is very easy to clean the floors around these pedestals because there is no place where the dirt can lodge.

Painting

The finishing work is coordinated with the project work in wood. Whatever the boy constructs he must finish either in stain or paint. The unit on painting and staining stresses the proper care of brushes. The brush received by the pupil must always be soft and clean. The pupil is not permitted to pass the brush on to another pupil. He must clean it when he is through

FIGURE 27. STORAGE FOR UNIT INSTRUCTION SHEETS.

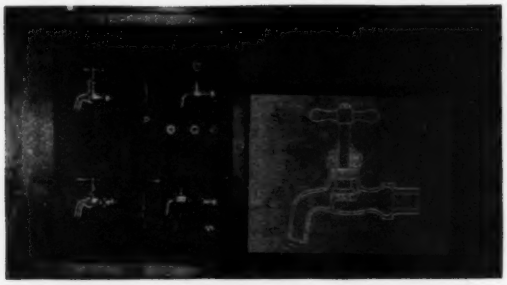


FIGURE 28. TEACHING BOARDS IN THE RACK OF A BALCONY LOCKER SLIDING DOOR.

using it and after inspection by his teacher return it to the case.

Instructors are required to keep all brushes, finishing tools, and finishing materials in a steel locker. In this storage locker, besides stains and paints, the instructor keeps two half-gallon cans of each of the following materials—varnish, alcohol, turpentine, benzine, white shellac, orange shellac, lubricating oil, drier, boiled linseed oil, and raw oil. Two cans of each are provided to make it possible to send empty cans to the paint shop for refilling and yet have a continuous supply in the home mechanics shop. The shop teacher keeps only a current supply on hand and is able to put the twenty cans on a single shelf of his cabinet.

The Balcony

To provide places where pupils can read reference material bearing on their units of instruction and where they can write their job reports, balconies were built over one-third the floor area of each shop. On each of these balconies two tables and eight chairs have been placed for the accommodation of boys at study. Along the length of these balconies against the walls, cabinets have been built in to provide storage for unit instruction sheets, notebook covers, reference books, and teaching boards. On the front of the sliding doors are racks into which the teaching boards fit. On these boards are mounted either drawings, pictures, materials, or parts that have a definite connection with the units in the outline of instruction and are used by the pupils for reference.

Classification of Pupils on a Basis of Vocational Objectives

R. W. Tarbell, Milwaukee, Wis.

THE day is passing when pupils will be required to submit to a narrow, prescribed, course of study. The system of electives, long accepted as an integral part of high school organization, is reaching down into the elementary grades. Opportunities are being offered, through the Junior high school, and in some grammar schools, for pupils to select a part of their courses. The job of making up a program of classes is thus turned over, in part, to the pupils. The curriculum has been expanded to the bursting point, in many places, and still the process of enlargement goes on. It is not only a difficult matter to decide just what should be given a place in the course of study; there are numerous complex problems in the administration of the curriculum, after it is completed.

We are coming to a fuller realization of the fact that an education should prepare people for a place in the world of work. Whatever profession or occupation the pupil finally enters, and whatever socalled culture may be woven into his period of schooling, we are becoming more certain that his days in the classroom should contribute something definite in the way of vocational preparation.

If we are to accept the principle that an education should prepare pupils for future work, it follows that there must be some correlation between the course of study and the vocational choice. It is perhaps beside the point to discuss here how soon this correlation should begin or when the standard course of study should start to branch out into the elective system. The purpose of this article is to show how pupils may be classified and assisted in choosing their courses.

When the principal undertakes to distribute a group of pupils into different classes, he ought to proceed along the lines of the best scientific practice, known to the profession. There should be no hit-and-miss selections, so long as the school is committed to the policy of guiding pupils into courses, according to vocational objectives. This means that someone in charge of guidance work must analyze the entire problem and develop a plan of procedure that will function.

The accompanying chart has been devised to illustrate how the problem of classification may be attacked. Since there will be a new group coming up to the point of classification at least once a year, and in many cases twice, and since readjustments will be made in the upper classes from time to time, it is important that an efficient plan be worked out and in operation. This has been attempted in the chart. It is evident that some of the material exhibited here will have local applications only. It is suggestive, however, of a general analysis, which can be worked out, with special interpretations to meet local situations.

The chart is divided into four columns. The first column contains six major problems, having to do with the business of classifying pupils on a basis of vocational objectives. A review of these problems will show their purposes. It is apparent that the person charged with the responsibility of distribution must determine the scope of his work, as to age and grade of pupils, and what jobs may be ahead of them. It is necessary, in starting any new work, to define the field of operation. The other problems are listed in the order of solution. A glance down the first column will show that the job of classification is mapped out in the rough, to the point

CLASSIFICATION CHART

Problems Involved	Ways and Means to Solve the Problems	Difficulties in Way of Solution	Means of Overcoming the Difficulties
1. What pupils as to age and grade are to be classified?	1. Find leaving grade and age of pupils, year by year.	1. Should be no difficulties.	1. Employers' reports. 2. Census reports.
		1. Difficulty of follow-up.	1. Watch work permits.
	2. Find jobs they enter.	2. Change jobs frequently.	2. Get reports from any possible source. 1. Have a placement bureau, public or in school.
	3. How soon will they enter a trade? When be old enough?	1. Uncertainty of employment. 2. Uncertainty of success in employment.	1. Continue training, as other job appears desirable.
	4. Survey of wishes of pupils and parents as to vocation.	1. Hard to get wishes known. 2. Hard to use information gathered.	1. Try visitation, a letter, or take word of pupil. 1. Advise further, interpret wishes, suggest changes.
	5. Read reports from other places.	1. Hard to get desirable information. 2. Hard to apply facts to local use.	1. Get all available information. Read up on subject. 1. Interpret the findings to suit local needs. Devise new ideas from findings in other places.
2. Devising a scheme of classification or method of procedure.	1. Study systems of classification in use.	1. Difficult to get the systems.	1. Extension courses have good ideas to follow. 2. Educational publications have many good ideas.
		2. Difficult to interpret the systems for use.	1. Use what is good, reject the rest.
		3. Takes too much time.	1. Only alternative left. 2. Make a start somewhere.
	2. Get advice from others in the field.	1. Hard to get good results by advice this way.	1. Advice from many will produce some good.
		2. Hard to know whom to ask.	1. Keep abreast of educational literature.
		3. Hard to interpret findings.	1. Make adjustments to suit local conditions. Confer with other local people.
	3. Experiment on schemes.	1. Experiments take too long a time.	1. Start with something. 1. Start moderately. Develop a safe procedure.
		2. Experiments are too costly.	
		3. Inability to experiment.	1. Employ someone who can do the work.
3. Application of scheme or method.	1. Try it on the pupils in September.	1. Objections by pupils.	1. Use legitimate persuasive measures.
		2. Objections by parents.	1. Explain benefits to parents.
		3. Difficulties in organization.	1. Proceed cautiously. Do a little at a time.
	2. Send proposed classification to each parent.	1. Difficulty as to manner of sending.	1. Mail or send by pupil.
		2. How explain the proposed classification so parents will understand it.	1. Send form letter or have pupil explain it.
		3. Hard to get a response from parents.	1. Prepare the notice so that no response is needed, unless an objection is to be made.
4. Interpreting and classifying findings.	1. List according to occupations.	1. This is comparatively easy.	1. Do the best possible with the facts as found.
	2. Divide into boni fide choices and otherwise.	1. Difficult to determine at this time.	1. Try out the courses. Change if necessary.
	3. Determine if choices can be carried out by pupils.	1. Difficult to secure data ahead of time.	1. School cannot be expected to assure a job.
	4. Determine if choice will bring results in a job.	1. Hard to foretell. 2. Lack of data.	1. Get all possible encouragement from outsiders as to probability of getting a job after training.
5. Organizing instruction to meet the needs of the pupils.	1. Analyze each occupation to find instructional content and prepare courses.	1. Getting into plants to study occupations.	1. Arrange with officials in plant to permit visits.
		2. Difficult for school people to analyze jobs.	1. Study methods of trade analysis. Hire someone to do it. Build up a gradual system.
	2. Find what other schools are doing.	1. Questionnaire difficulties.	1. Some good ideas can be gathered from questionnaires.
		2. Hard to visit other schools.	1. Gather ideas from others at school conventions.
		3. Hard to use plans from other places.	1. Make applications to suit local needs.
	3. Get advice from tradesmen.	1. Difficult to get expert advice.	1. Don't believe everybody.
		2. Tradesmen often have biased views.	1. Weigh all advice very carefully.
		3. Too much scattered advice.	1. Usually part of it is good.
	4. Get an expert to prepare the courses.	1. Few real experts to be found for this work.	1. Get them by usual methods. Advertise, etc.
		2. Difficulty in judging who is expert.	1. Use professional methods. Study their work and results.
	5. Start in with elementary work. Teachers prepare lessons.	1. Poor teaching with no course. 2. Likely to stay undeveloped.	1. Confine work to few simple things at first.
		3. Lack of time.	1. Supervision should require improvements.
		4. Improvement likely to be provincial.	1. Board should grant time for this extra work. 1. Exchange courses. Get ideas from other places.
6. Enrolling pupils in courses they should take.	1. Have pupils choose the courses.	1. Pupils often choose unwisely.	1. Little harm done with unwise choice. Change later.
		2. Pupils often make no choice.	1. Teacher may assign such cases to a class.
	2. Have parent-pupil-teacher conferences.	1. Hard to get conferences with parents.	1. Part of the wise teacher's work is to bring about an agreement. Unwise choices can be changed.
		2. Often hard to get an agreement in conference.	
		3. Unwise choices often made.	
	3. Get prominent manufacturers to advise pupils on choices.	1. Liability of biased views.	1. Get all the views possible. Choose the best.
		2. Views may be unintelligent.	
		3. Hard to get outsiders to give time to pupils.	1. Have frequent gatherings. Invite people in to speak.
	4. Have publications and bulletins to show possibilities in different lines of work.	1. Difficulty in preparation of bulletins.	1. Encourage each industry to prepare its own bulletins.
		2. Who in faculty will do it?	1. Develop a teacher or business man to do the work.
		3. Difficulty in meeting the cost.	1. School typing or printing department do the printing.
		4. Difficulty in getting them read.	1. Mail or send out the bulletins, whether read or not.

where pupils are enrolled and turned over to the classroom teachers.

In the second column are listed methods of solving each of the problems. In some cases these items may overlap, but they do not conflict. In some localities one method will work better than another. Combinations of two or more methods may serve better in other instances. The second major problem illustrates very clearly how the chart works. In devising a plan of procedure, we find three possible avenues open. These are listed in the second column. The same principle applies for the others.

Thus far the work seems easy. Our analysis has been purely academic. If everything would work out that well in practice, a veritable Utopia would be realized. But there are difficulties to be met. Probably every solution of a problem in school administration has difficulties in the way of application. The third column contains difficulties to be met in applying the solutions. A glance down the third column gives a pessimistic outlook. One easily gains the impression that the entire scheme is falling down. This is the purpose of the difficulty column. If there are weaknesses in the procedure, they should be known and charted at the start.

The fourth column contains ways and means for overcoming the difficulties listed in the third column. This completes our analysis and, if there are no errors in the process, we have a detailed program, for carrying out a scheme of classification, under the various circumstances that may arise. The writer is not suffering under the illusion that all cases have been cared for in the chart. There are so many shades of circumstance, which require various methods of treatment, according to local needs, that it seems impossible to prepare a general analysis, to fit all cases. The chart is suggestive of what may be done to bring about a better classification of pupils.

The Trade Extension School of Los Angeles, California

Sadie C. Atherton, Formerly Principal

OF all types of vocational education discussed and being put into practice in this country today, the trade-extension type is conceded to be the most valuable and effective, especially for the older student. It is also the least common type to be found, probably because of the difficulties of its establishment. These difficulties, however, fade when properly balanced agencies are brought together in its administration. While educators have been discussing just where our "dynamic evolving social order" is leading to and trying to justify the training for a vocation under the public school system, Los Angeles has been busy in actually attempting to work out a system.

The first step was the establishment of an evening school operating under the administration of the Los Angeles Board of Education in leased quarters in the Labor Temple, in 1917. For the most part only trade related classes were held, principally in mathematics, science, theory, blue prints, drawing and with a few classes in actual trade practice. The majority of the students were from the building trades and members of organized labor. These men had made a definite start in a chosen occupation and many were journeymen of several years' standing. The work was given in short units and was very closely tied up with the actual trade experience. Many of these courses were worked out by committees from the trades. Nothing was incorporated in any of them, which was not vital. The trade was studied and what was necessary for success and promotion was taken as a basis for the course. An inductive method of curriculum making was employed with the very first class and has continued through the entire growth of the school. No unit has ever been set up, which was not first asked for by a sufficiently large group to warrant it a place on the program.

The Impetus From Labor

The real impetus in this type of education came from labor itself and not from the school element. Similar ventures in vocational instruction had been attempted by these same parties previous to the cooperation of the school board which continued for a year or more, dying a natural death from want of proper administration. Work of this sort takes time and constant constructive building. It cannot be fostered in a haphazard manner and continue to function. But, the fact that it germinated here within the ranks of labor is a significant factor in its present success. These men and their leaders were firmly convinced of the urgency and dire need of not only the development of further skills among their number, but, they, perhaps more than any other group, were more keenly aware of the evolution of industry and its demands in obtaining a higher degree of efficiency from its workers, equipment and materials. Also, that specialization is more and more crowding out the opportunity to develop trade skill and thus robbing the worker of his last bit of capital—giving in its place a highly specialized skill which is not generally marketable. With an intelligent group of workers who have the power to analyze their situation to this extent, much of the difficulty of organization of classes is eliminated.

The scope of this series of evening classes gradually enlarged and its immense possibilities became very evident. The results of instruction began to attract the attention of the employing element to such an extent that it germinated in their minds thoughts of what might be done through extending it, more systematically arranged, into a day system of apprentice training. Plans were drawn up for such day classes and placed before the board of education by the merchant plumbers' association, the local union of plumbers and steamfitters, the mason contractors' association, the bricklayers' local union, the tile dealers' association, and the tile setters' union, with representatives of several other crafts.

The Early Beginnings

After some deliberation and investigation of the field by the board of education for the purpose of determining the financial outlay necessary, they agreed to cooperate in an administrating capacity in the establishment and maintenance of a "Trade Extension School." This school

FIG. 1. BRICKLAYERS' CLASS AT THE LOS ANGELES TRADE EXTENSION SCHOOL, LOS ANGELES, CALIF.

was to furnish training for apprentices in addition to such courses as would more fully satisfy the demands of journeymen in all stages of the building trades. The principal of the evening school was made coordinator of trade extension, larger quarters were secured and the work of building up advisory boards for the different apprentice departments was at once entered into.

In June, 1923, part-time trade extension classes were opened in brick-laying, tile-setting, plumbing and welding. Classes in trade-preparatory carpentry have been added since, operating through the shops of one of the other high schools. Each of the departments is controlled by a board made up of representatives from the employers, employees and the school. These boards differ in size, some having only seven members, three from employers, three from employees and the teacher from the school. Others have representatives from manufacturers, jobbers, realtors, general and sub-contractors, builders' exchange, chamber of commerce, associated building crafts and other civic bodies. From these latter organizations a central apprentice commission is formed which acts with all advisory boards of the school. This commission serves as a splendid balance wheel for the work, having developed a spirit of adjustment rather than compromise. These men—both the members of the commission and advisory boards—are representatives of large organizations which, in their turn, serve as excellent promoters not only of vocational education but of education in general. It is interesting to note that the merchant plumbers' association, becoming interested in the work of the school, made arrangements through their educational director and carried on a twenty weeks' course in simplified bookkeeping for some eighty of their members.

The Organization of Departments

In the organization for attendance in the several departments the plans differ. In brick-laying and plumbing, students attend a half day per week, a few for the entire day. In tile, two classes alternate on the twenty-day in-and-out plan, eight hours per day, over a period of six months. In welding, the men attend continuously until completion of such units as they want. Organized labor shows its confidence in the work, endorsed by their employers, by cutting down the three years of apprenticeship demanded in tile-setting to two years for those students who complete the work with high credits. Similar credit is given in brick-laying, but a post-graduate course is demanded. Plumbing has no recognized apprenticeship here. The course is laid out to cover three years' time on the four-hour-a-week basis. There is much convincing evidence that third year work would be better attended if transferred to evening classes.

Apprentices, on entering for enrollment, are examined, graded and assigned to classes varying in size from eight to eighteen. The best work is done, perhaps, with a class of about ten. As to method of attendance the twenty-day in-and-out plan of the tile department proves far more effective. There is a continuity of work, a sustained interest, a spirit of achievement that does not exist in other departments. Trade preparatory work has not entered into the work of this school sufficiently strong to deserve mention.

The Classes and Courses

As a rule trade extension classes are conducted in the shops where the students work. The related subjects are the ones demanding most attention. In Los Angeles the students come to a centralized shop in the school

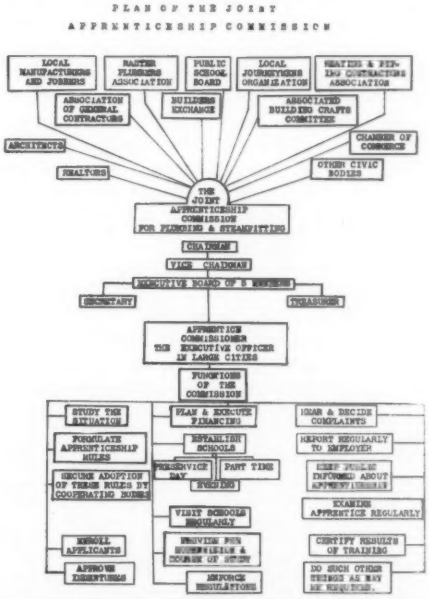


FIG. 2. PLANS FOR CO-OPERATIVE CONTROL OF THE EDUCATION OF PLUMBERS IN THE LOS ANGELES TRADE EXTENSION SCHOOL. SIMILAR PLANS APPLY TO OTHER TRADES.

building where all trade equipment is furnished by the industry. In the building trades the men are scattered throughout the city at their work, hence the need for a centralized shop. There they have one hour of intensive related work under one teacher, and three hours of trade work under a trade instructor. Much of the three hours' work is actually related work taught in direct connection with the trade processes. Attendance is checked by the teacher in a record book which remains with the student. In the brick-laying department those boys belonging to the union have to submit their books to their officers once a month. Attendance is made compulsory by the union and unexcused absence means forfeiture of the union card. The brick-layers' union also keeps an agent in the field for apprentices only. It is his business to keep in daily contact with the school in matters relating to attendance. In addition to the record books, regular reports are sent monthly to the employers stating the grades in both related and trade work. Applied mathematics, science, blue prints of plans, English, history of materials, trades, and trade organization, and a short course in civics and economics are given. Some reading and study are assigned for outside work.

Practice in trade work is by no means the main feature of the courses, although a large amount of equipment is used. The school pays more attention to the "why" of the trade than the "how"; the equipment being used largely to test out the correctness of a student's layout. Emphasis is laid on the theoretical, technical and scientific points since practice on the job after correct teaching will bring trade skill.

Students visit the local manufacturing plants to see special lines of materials produced. Technical motion picture reels have been used with great success as instructional material. Experts in specialized lines relating to the trades often lecture on and demonstrate the practical application of scientific laws.

What Has Been Accomplished

Since the first evening classes were established there have been approximately 14,000 men enrolled. About thirty of these have been under the age of 18, the majority ranging from 18 to 29. A very close record of the amount of the common school education these men have had has been kept. During the first five years the checking level was the sixth grade. It has risen during the last two years to the first year of high school. There may be several reasons for this. Two are evident; one, that the regular school compulsory attendance laws are showing effect, the other that craftsmanship, because of the progress in processes, is having a decided tendency toward reaching the standards of the professions and a much higher mental capacity in the workers is demanded.

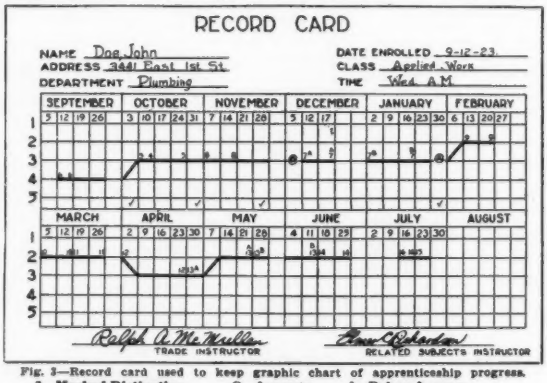


Fig. 3—Record card used to keep graphic chart of apprenticeship progress.
1—Marked Distinction 2—Above Average 3—Average 4—Below Average 5—Failure

FIGURE 3

The gradual enlargement of the regular high school curriculum is having a decided tendency to hold boys in school for a longer period, where economic pressure has not forced them out. Whether the intelligence quotient of these men in attendance during the last two years has been higher or not has not been tested. There is a crying need for tests of aptitudes and capacities in trade work. Many are in trades who are unfit, others misplaced. The employing element, because of the time and money they are putting into the work, if for no higher motive, has a right to expect much of educators in assisting to ascertain those who are worthy and capable of higher development. While it is the business of this school to bring all these students up to a minimum level of trade achievement, it is at the same time its most certain duty to have the means at hand to not only determine the type and extent of individual differences, but to develop each individual to the maximum of his ability. Out of these apprentices are to come many of the next leaders of industry.

Los Angeles has had the eyes of the nation turned toward it the past few years because of its rapid growth. Thousands of unskilled and semi-skilled mechanics come to the city. These increase the need of such work as the trade extension school is doing. The great need here is not to recruit apprentices, but to find legitimate means for training those who are within our gates. Economic conditions in Los Angeles are not duplicated in any other city of the country. Because of the more or less transitory class of workmen to be found here, it has been difficult to sell the idea of "pay-the-apprentice-while-in-school" to many of the employers. The least difficulty in securing cooperation of labor and capital in the field of trade-extension will be encountered where organization prevails, where one or two employers control a large number of beginning workmen and the idea is sold to them with resultant compulsory measures put into action, or where organized labor controls a high percentage of the field and adopts this system of training for its apprentices.

How Industry is Helping

Teaching materials have been collected, newly made, readjusted, and are being constantly added to. A reference library is being gradually collected as funds permit. Trade journals form an important item in the school work. The board of education furnishes the housing for the school, pays the salaries of the teachers, and supplies such lines of equipment as are usually found in high schools. The employers furnish, through the help of material men, manufacturers, architects, etc., all lines of trade equipment. The unions have, in several instances, assisted in the payment of the teachers during such periods of vacation as the board of education was unable to take care of. It must be remembered this school is conducted twelve months of the year.

The basic course of study recently compiled by the National Tile Manufacturers' Association was used in the training of the tile-setting apprentices. The advanced interpretive background of these apprentices, furnished by their experience as helpers before entering the school, permitted several projects to be added to the tile course. This course is fundamentally trade preparatory. The contribution to teaching material made by the national manufacturers is by far one of the most splendid in the field of vocational training. The National Trade Extension Bureau of Plumbing and Steamfitting has been busy during the past year compiling splendid material for use in plumbing classes.

While the Trade Extension School of Los Angeles is in no sense an engineering school, it is evident that not

many of its students expect to remain just workmen. They are more or less a selected group and display a studious, purposeful attitude toward their work that will bring many of them into positions of foremanship. The school is awakening an interest, too, in more general education. A comparative study of trades and trade conditions arouses in the student a tolerance toward the ideas of his fellow workmen. His introduction to economics awakens in him an appreciation of the financial aspects of business, of overhead expense and the part he plays in raising or lowering it. These apprentices are engaged in positive vocational education which, viewed in the light of modern psychological and educational theory, has "value, character, and aims" determined by their activities.

A One-Year Course in Architectural Drawing for High Schools

Gilman Lane, Oak Park and River Forest Twp. High School, Oak Park, Ill.

IN considering a subject of this kind, it is customary to first state the aim of the course. However, it is easier to first eliminate a number of aims which such a course cannot hope to have. It should not attempt to make architects; it cannot hope to do in one year what the university takes four to do. Nor should it be merely a training school for those who intend to study architecture in the university. It should not train boys merely to become tracers at the boards of those who have had a university training. There would not be enough places for such boys to work, if such were the purpose of the course. Surely such a course should not be just a credit toward graduation. What then, should be the aim?

Any course offered in high school should be of either practical or cultural value; or better yet of both practical and cultural value. The course under consideration is both. It is an attempt to teach appreciation of architecture and architectural design as applied to the home. It is an informational course, teaching its followers to more intelligently design, or choose, their own home at some later time; to enable them to choose a home that combines efficiency with good taste. Surely that ought to be the ideal of every home-owner. The course aims to give the student a consumer's knowledge of house architecture. It aims to teach that design, not money, makes a beautiful building; that the four-room cottage may be as well designed, even better designed, than the fifty-thousand-dollar mansion. We see everywhere the lack of efficiency and good taste, in home building. Go down any street in any town, you will find "misfit" houses that are a collection of boxes under one roof; houses that are ornamented with "gingerbread" work. There is no need to enumerate further atrocities committed in the name of home building—we are all familiar with them. It is our duty to attempt to correct these erroneous ideas of what a home should be. This course is practical insofar as it teaches what to demand in the way of a home from a practical standpoint; good design, good materials, good workmanship. Needless to say, a house with these features has a much larger intrinsic value than one that lacks them, even though it may cost less to build.

Cultural Values

Perhaps as great as the practical side is the cultural side. There are a great many definitions of culture. To me the most satisfactory is this one: "The ability to respond to a greater number of stimulae." How many of us, in our manual arts courses, help students to become more cultured by teaching them appreciation of good work; of an excellent piece of furniture, of a well executed pattern, or of a well designed home? A student taught to appreciate a well designed home, will not only recognize one when he is grown to manhood, but will demand one from his architect when he builds, or his realtor when he buys. He will be trained to recognize at once good proportion, symmetry or balance, simplicity of detail, and many other of the qualities that go to make up a well designed home. He will take pleasure in beholding these qualities. To the extent he learns to appreciate them, to that extent will he be more cultured than his neighbor, to whom a house is a house, and can never be a work of art. He has had developed for him a new set of stimulae to go along side by side with those acquired by the study of literature, drama, art. To some the study and appreciation of architecture means only the study of Roman temples or great cathedrals. The peasant's humble cottage means nothing to them. The purpose of the course is not to discourage the study of these larger examples of beauty, but rather to look for additional beauty in the architecture that is closest to us, that of the home.

Such a course is bound to have other contacts with the world at large. A noted statesman once said: "The foundation of a nation rests in its homes." To be sure, a home means more than a house, but the house helps make the home. A course that teaches good home design also stimulates home building and home owning. A home-owner is a stock-owner in the city, the state, the nation. He is sure to have a greater interest in the welfare of the community in which he lives, than the man who moves the first of every May. He may kick at the high taxes, but he smiles as the rent collector passes by his door. As a nation it appears that we are becoming more restless than ever before. We change jobs, and towns, many times in a few years, while our ancestors lived for several generations on a homestead. Of course, this change is due largely to a more complicated economic condition. Home-owners are less hasty to move about than those who own no property. It must be remembered that the home-owner contributes more to the progress of the community than does the floater, who is in and out with the tide of fortune. Let us do what we can to promote the desire for home-owning, if it will do a little bit toward making this a more stable nation.

Then there is this side: Sociologists tell us that the many outside activities are ruining the home life of the nation. People stay in their homes only long enough to eat and sleep—little enough of the latter, at that. At least a part of the answer is to make the home so attractive that its occupants will rather stay home than go elsewhere. Again, this depends largely upon the human element, but attractive rooms, attractively furnished, help a lot in bringing contentment and happiness into the home. It is impossible to judge how much pleasant surroundings have to do with keeping people, particularly young people, in the home during their leisure time, but surely they do help some. Then it is our duty to do our

[1]Delivered at Illinois High School Conference, University of Illinois, Nov. 21, 1924.

bit in making this a nation of contented home-owners.

A Workable Course

Perhaps, some of you are asking if such a course is really workable. Let me answer that it is. By workable is meant that it is possible for the student to get something tangible out of it.

How much benefit a student derives from a course of this kind depends, of course, on how much he is willing to put into it. To say the least, it is easy to arouse interest in the course when it is handled right. Evidences of this are not lacking. Students bring books and magazines pertaining to house design, tell of interesting exhibits they have seen, of examples of new building methods, or of good or bad design. The boys see the practical, the useful, the vital side and are interested because they see the connection between what they are studying and the problems of the world about them. It is a means of bringing the problems of the building trades into the schools; not only the problems, but also the finer things, the knowledge of what is right and wrong, good or bad, in the expression of the industry.

The question may arise, does not such a course require more maturity than high school students possess? Facts do not bear out the affirmative. The average adult is too old to learn new ideas in architecture. He doesn't know that he doesn't know all that there is to know about houses. He has been familiar with them all his life. If you try to teach him that a certain thing is inartistic, he will take you out on the street and show you a dozen just like it. The high school boy may do this, too; but his mind is open and susceptible to influence. The time to start drilling on the principles of good design is when the mind is young.

Not a Radical Departure

At first glance it may seem that a course with aims such as this one is a radical departure from the steps of our forefathers in education. It may be in method, but the precedent is very old. The Colonial house is probably the most popular of styles today; not the latest word, perhaps, but still a standard of excellence. Why? There are many reasons why this is true; there is one that bears directly on the question. At the time of the development of the various Colonial styles it was considered a part of every gentleman's education to be able to design his own house. Washington was such a man, and his Mt. Vernon still lives. Jefferson was such a man, and his Monticello still lives. Either could be used today as a model, from the standpoint of design. The same is true of other Colonials. We have periods of rise and fall in literature, art, finance, and architecture. If we would return to a period of rise in architecture, we might well go back to the Colonial idea and make home architecture a part of every man's, and perhaps woman's, education; in other words, a part of the education of every American youth. We are just emerging from the dark Victorian age of architecture, and if such a course will encourage the present-day trend, then let us have it by all means.

In these days of inquiries into costs, let just a word be said regarding the cost of this course. The same drawing rooms and equipment can be used that are used for other courses in drawing. If such a room is not already available, it costs no more to equip it than it would for mechanical drawing. There should be a number of good books and magazines available for student use. Money invested in lantern slides illustrating the instructor's talks is well spent.

The syllabus just mentioned outlines in considerable detail the subjects treated by the lectures. The materials that go into the instructor's talks should be gleaned from much reading of good books, magazines, and educational pamphlets printed by manufacturers of building materials. This material should not be "fixed," but brought up to date every year by the addition of up-to-date material. As often as possible, lantern slides should be used to supplement these talks, illustrating the points under discussion. The instructor will be able to get his material "across" much more easily if visual aids are used, as the eye grasps an impression much more quickly than the ear. Many of the principles of good design must be shown by picture or diagram, and the slide is ideal for presenting these to all of the students at the same time.

The Practical Work

However, the course is not all talks by the instructor. The student has some real work mapped out for him. As a prerequisite for this course, the student should have had a year's work in mechanical drawing, so that no time will have to be taken to learn how to use tools, or the fundamental principles of drafting practice. The first job the student has to do is explained in the syllabus, as is also the second assignment.

The third, and succeeding assignments, should call for original work, original in the sense that none of it is copied, but is rather the result of the student's reading and observation, and the talks by the instructor. The student should get an idea here, one there, make freehand sketches on cross section paper of numerous floor plans, finally choosing the most satisfactory one to work up into floor plans and elevations. This assignment should be a little more elaborate than the previous ones, calling for basement and two floor plans, at least three elevations, and a sheet or two of details. If the student is capable, he may later attempt a mechanical or freehand perspective of the house. The method of assigning the third job is given more in detail in the syllabus.

The first of these jobs is usually inked directly on the detail paper; all later jobs are traced, blue printed, and bound together like a professional job. The student should draw nothing he does not understand, and should be made to see that the first two jobs are really to prepare him for the later and more important jobs. The number of these he may be expected to do varies, of course, with the time allowed, the size of the project, and other obvious factors.

The Failure of Copying

Now compare the content of this course with one in which the student spends one or two semesters copying details of moldings, framing details, masonry details, etc. In such a course the student gets practice in drawing, but little else, unless it is wonder at where so many queer shaped things go. Such a course lacks unity of purpose. The student is not working toward one end; each plate is separate, and not "vitalized" by being but one of a series of progressive steps toward one end, that of designing an ideal house. Some courses are taught from texts or blue prints where the drawings are taken directly from approved details in manufacturers' hand books, but many of them are not of sufficient value in house design to pay for the trouble in copying them. Once copied, of what good are they? The student does not connect them with any particular building, and would not be able to, if asked to.

In the course under consideration, for a contrasting example, all of the common ways of laying a brick wall are discussed and shown in slides or sketches, and compared in regard to strength, permanence, warmth, beauty, cost, etc., in the talks by the instructor; but the student draws only the brick wall that is used in his particular house. This particular wall is chosen as being the most suitable for the particular conditions existing in this

house. The same methods are used in discussing all other wall materials, roofing materials, and all other materials that go into the house. It is possible to cover a great many more materials in this way, and the student learns much more about the choice of suitable materials than if he had been required to draw details of a few methods of construction. He might copy a lot of these details without any discussion as to relative merits, and not have any idea what he has drawn. Work of this kind may be done without much thought on the part of the student, or the teacher, either. In the course under consideration, the student is constantly working toward one end—the design of a house, *his house;* one that he feels responsible for and will defend. He draws details, as he needs them; he may have to do considerable "research" work before he finds just what he wants; different conditions than where details are thrust upon him, without his being able to find any use for them!

Drawing a House vs. The Orders

In some courses, after a semester or two of drawing details, the student copies exactly the plans and elevations in his text, or possibly from the advertisement of some well meaning lumber dealer. No attention is paid to the design of the house, whether it is in good taste, or a hideous monstrocity. Many of these houses have exteriors that violate principles of good design; they may be labeled a good style of architecture, and be merely an exaggeration of the strong points of that style, or they may make no pretensions, and be the same type that has been built so much, that make many of our streets hideous from the artistic standpoint. The power of discrimination should be used in selecting these problems. Better to draw no house at all, than a poor one and not know it; better yet to draw a good one and know wherein it is good. Again, the student may draw the Orders of Architecture. They do make a pretty picture, if well drawn, but no more beautiful than a well designed house. Why go so far beyond the experience of the boy for problems, when problems may be taken from the every day life about him? The Orders of Architecture are bound to be all copy work; the designing of a home requires thought on the part of the student.

In conclusion, let me repeat that I have attempted to outline, together with the syllabus, a course in architectural drawing that, as such, is of greater practical and cultural value than many other types of courses. I have tried to show, also, that it has extra-mural values well worth the teaching of it for their sake. It is a highly thought-provoking course, and surely that is what we want in our curricula. Courses that are all copy work should be avoided, although some may be necessary in preparation for later original work, as in this course. This sort of course means more work for the teacher, more enthusiasm for the boy, with a greater amount of good resulting. I believe it should be encouraged, for the good of the student, on the one hand, and the good of the community on the other.

SYLLABUS FOR A ONE YEAR COURSE IN ARCHITECTURAL DRAWING FOR HIGH SCHOOLS
Gilman Lane, Oak Park and River Forest High School, Oak Park, Illinois

I. Student Assignments.
II. Outline of subject matter given by instructor in form of illustrated talks.
III. Bibliography of helpful books.

I. Student Assignments.
(Note: While the first two assignments are being worked out by the class, the instructor presents the larger part of the subject matter of the course in the form of informal talks, illustrated. These serve as a basis for later work by the student.)
1. Copying floor plans of well designed houses, particular attention being paid to architectural technique, new methods, notes, etc.
2. Semi-original job—one of several types:
   (a) Working up floor plans of well designed house from room lay-outs with exterior picture to serve as basis for drawing elevations.
   (b) Working up floor plans as above, changing exterior design from New England Colonial to Dutch Colonial, for example.
   (c) Working up floor plans as above, of house with poorly designed exterior, required to work up elevations in good design.
3. All further assignments should call for original work, original in the sense that the plans and elevations are not copied, but are rather the result of the student's reading and observations, and the instructor's talks on design, etc. These assignments should be more elaborate than the preceding ones: three floor plans, four elevations, a sheet of details. If the ability of the student warrants, a perspective may be attempted. Any number of combinations may be made from the following:
   (a) Instructor may assign number of rooms, materials to be used, style to be followed.
   (b) Student may be limited to definite number of rooms, and to permanent materials, or any specified materials.
   (c) Student may be given size and location of lot with respect to compass, number of people to be housed, required to draw best house to fit conditions.
   (d) Class may work in competition on same assignment, best design to be selected when all are finished.
4. Much material will be found in books and magazines that may be assigned for home reading, to be reported on in class or handed in as term paper.

II. Outline of Subject Matter for Illustrated Class Talks (some of the following can be covered in one talk; others in several).
1. Precedents of architecture in America (the Colonials, English cottage, Italian, Span.).
2. Development of Architecture in America (settler's cabin to present).
3. Selecting a site for a home (view, direction lot faces, public utilities, transportation, schools, churches, etc.).
4. Selecting a style of architecture (to suit site, surroundings, amount of room needed, zoning laws, etc.).
5. Plan arrangement (Size and number of rooms, convenience, economical to build).
6. Principles of good design (simplicity, symmetry or balance, proportion, etc.).
7. Choice of materials for exterior walls (wood, stone, brick, tile, stucco, concrete, etc.).
8. Choice of materials for roof (wood shingles, asphalt, slate, asbestos, tile).
9. Some problems of house design (wall spaces and openings, roof design, windows, doors, shutters, cornice, porch, chimney, etc.).
10. Building for permanence and minimum maintenance costs (fireproof materials, steel joists, insulating against heat and cold, metal lath, etc.).
11. Heating, plumbing, lighting equipment (ideal plants, comparisons, etc.).
12. Finishing inside walls and floors (plaster finishes, woodwork, paints, wall covering, varnishes and enamels, etc.)
13. Value of landscape gardening.

Wild Flower Designs

Article I: Making Balanced Design Units

Nettie S. Smith, Smith Center, Kans.

The Spiderwort

An interesting plant with its beautiful blue flowers of rare form and arrangement is the spiderwort or spiderlily. It is a prairie flower which grows among the grass in low places where it can get plenty of moisture. Though the blossoms are mostly blue, a colony of the plants may present hues from blue through violet and lavender almost to rose color. The two upper leaves of the plant form a boat-like spathe enclosing the unusual inflorescence. There is a cluster of many buds; one rises from the group and spreads its lovely blue sail above the heads of its companions. For a good part of the day it stands in glory, but the next day the erect little stem has become curved and hangs over the side of the "boat." The petals have withdrawn into the calyx, wringing out their color which may sometimes be seen hanging like a big indigo tear-drop. No wonder the plant has been called "Job's tears."

A royal association in olden days is indicated by the botanical name, Tradescantia. This name was given for Tradescant, a naturalist who became gardener to Charles I of England.

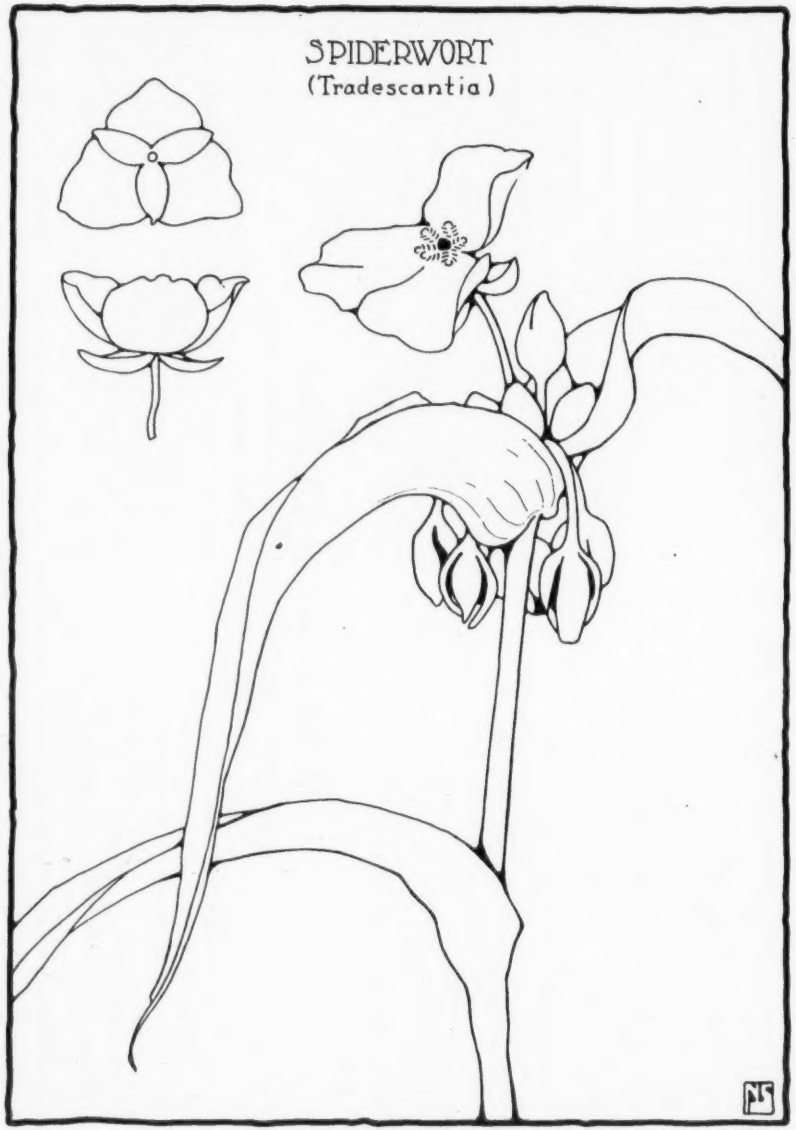


PLATE 1.

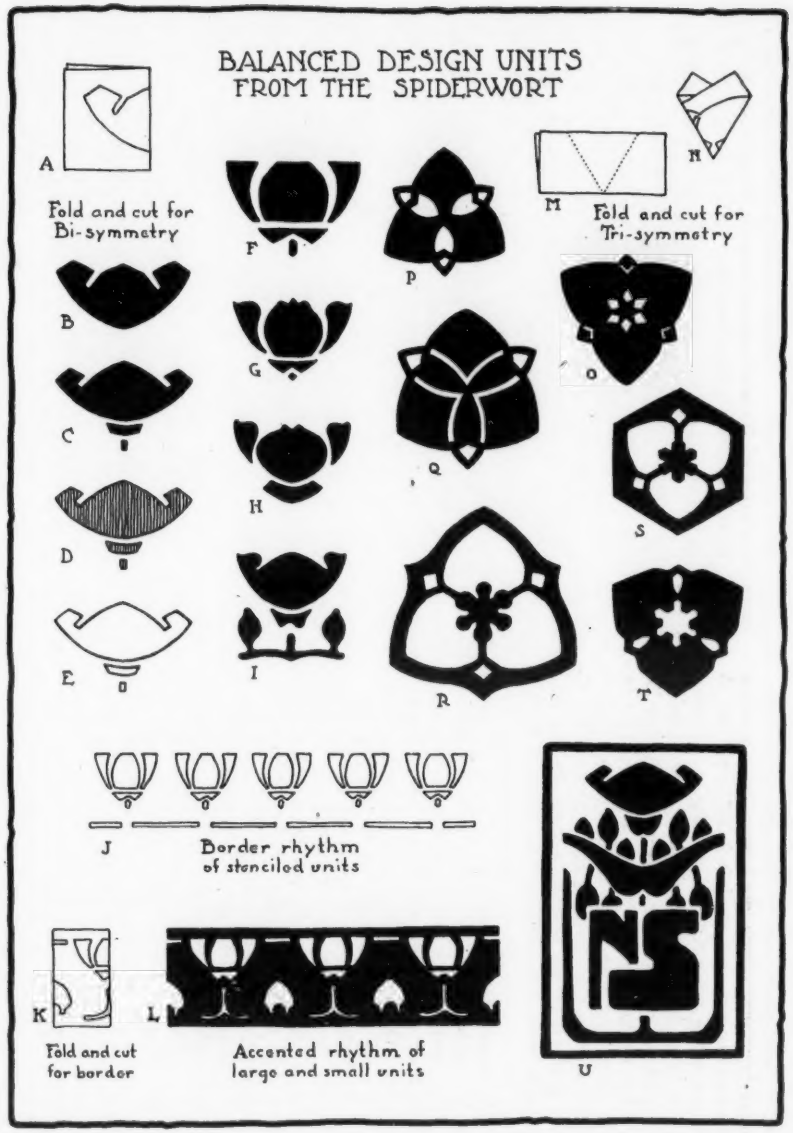
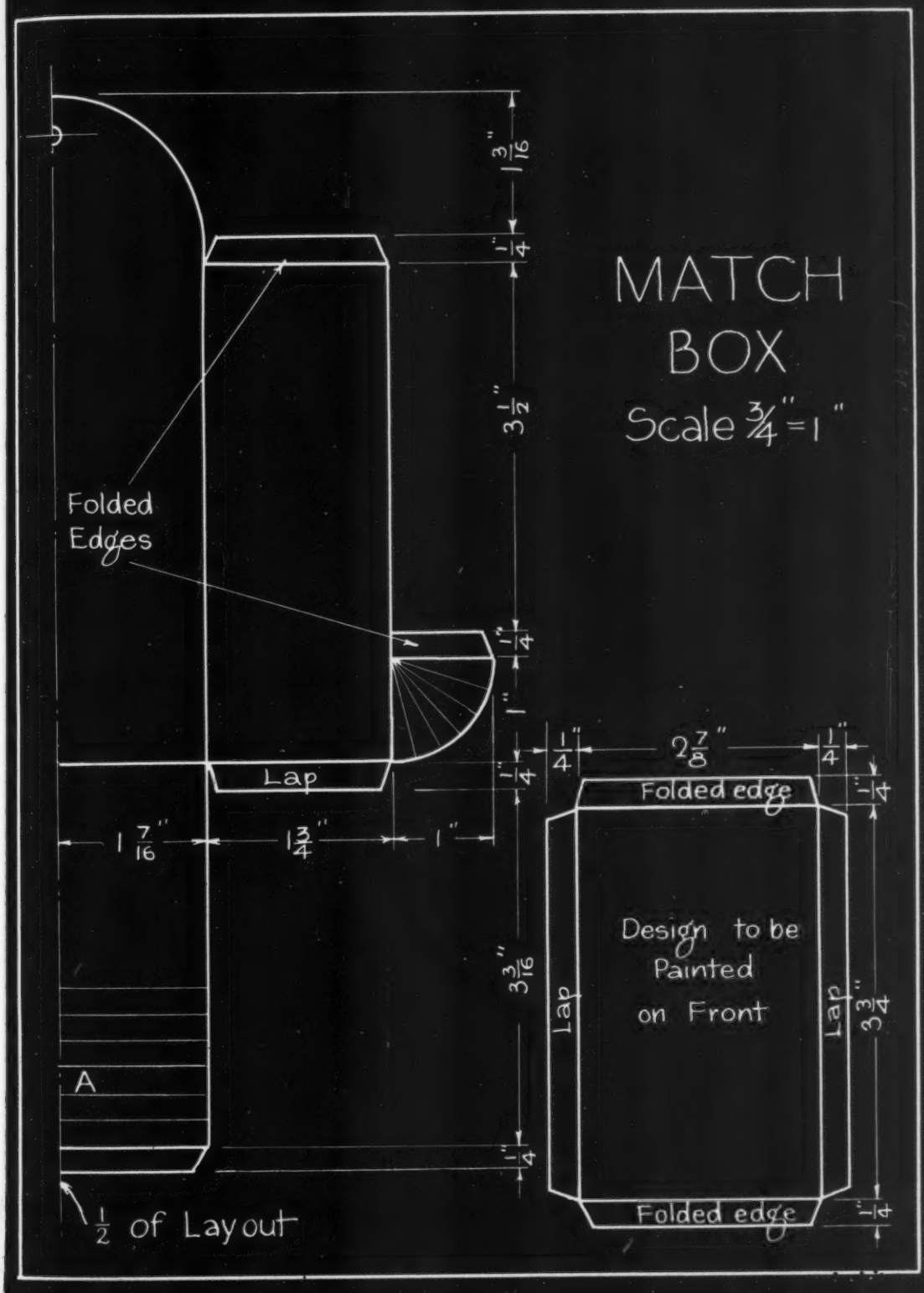


PLATE 2.


MATCH
BOX
Scale 3/4" = 1"
Folded
Edges
1 3/16"
1/4"
3 1/2"
1/4"
1"
1/4"
Lap
1/4"
2 7/8"
1/4"
Folded edge
1/4"
1 7/16"
1 3/4"
1"
Design to be
Painted
on Front
Lap
Lap
3 3/16"
3 3/4"
A
1/4"
1/2 of Layout
Folded edge
1/4"

MATCH BOX

W. J. Knupp, West Junior High School,
Sioux City, Ia.

Although the match box is an old problem in sheet-metal work, this particular one still carries the interest of the average boy. It is made from a carefully worked out drawing by the student, then transferred to bright tin by the prick punch method. All lines are drawn on the stretch-out, then cut out. The instructor has worked out a demonstration board of each step which is placed before the students at all times. This demonstration board shows each step taken up in the proper order.

First Step—Bending all folded edges and boring hole.

Second Step—Bending of laps and bottom perpendicular to back.

Third Step—Bending of sides perpendicular to back and soldering to bottom. Part A is shaped by the thumb, or over the end of a board with curved edge.

Fourth Step—Making of front and soldering in place.

Fifth Step—Lacquering after polishing with steel wool.

Sixth Step—Designing and painting with enamel paints.

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REVOLVING DOUGHNUT CUTTER

F. B. Jewson, Instructor Sheet Metal, Central Vocational School, Wausau, Wis.

The Revolving Doughnut Cutter is just what the name indicates—it cuts as it revolves. It is a good problem for the average school child for a number of reasons: First, it is simple in layout; second, small scraps of metal can be utilized; and third, boys enjoy making it.

The layout is as follows: Lay out profile "A"—any convenient size, and space out in equal number of parts. Lay out the circle in profile "B" with its radius equal to "R" in profile "A", dividing also into an equal number of parts and proceed as in the illustration. The handle is made of No. 12 gauge copper-coated wire, twisted and formed as in the accompanying sketch. A washer is soldered on wire at "C" to afford easy turning of cutter.

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HANDY "BOX CONSTRUCTION"

F. B. Jewson, Instructor Sheet Metal, Wausau Vocational School, Wausau, Wisconsin

This type of construction gives the student a good layout problem that can be done right on the metal. At the same time he is given a chance to familiarize himself with the cornice brake.

This box makes up very strong and if plenty of time is taken and neat work done has an added tone of beauty.

The lower part of the box is made up in three sections—sides and bottom and two ends, the ends being double seamed in place by a one-quarter inch seam. The cover is reinforced with No. 10 gauge wire. Places for hinges and hasp having been cut out before forming. Hinges, handles and hasp are hand made. The handles are made of 3/16 inch rod.

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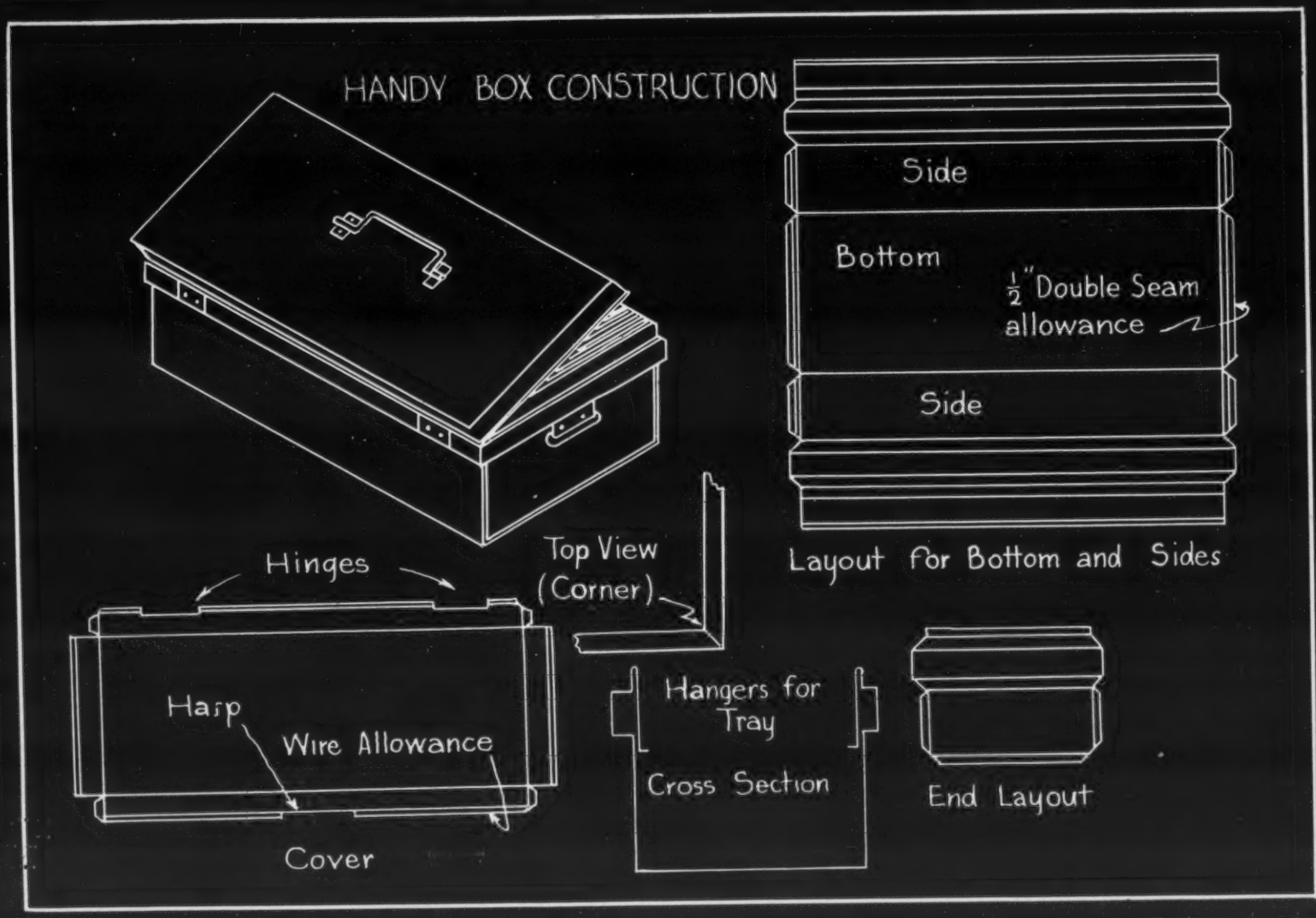
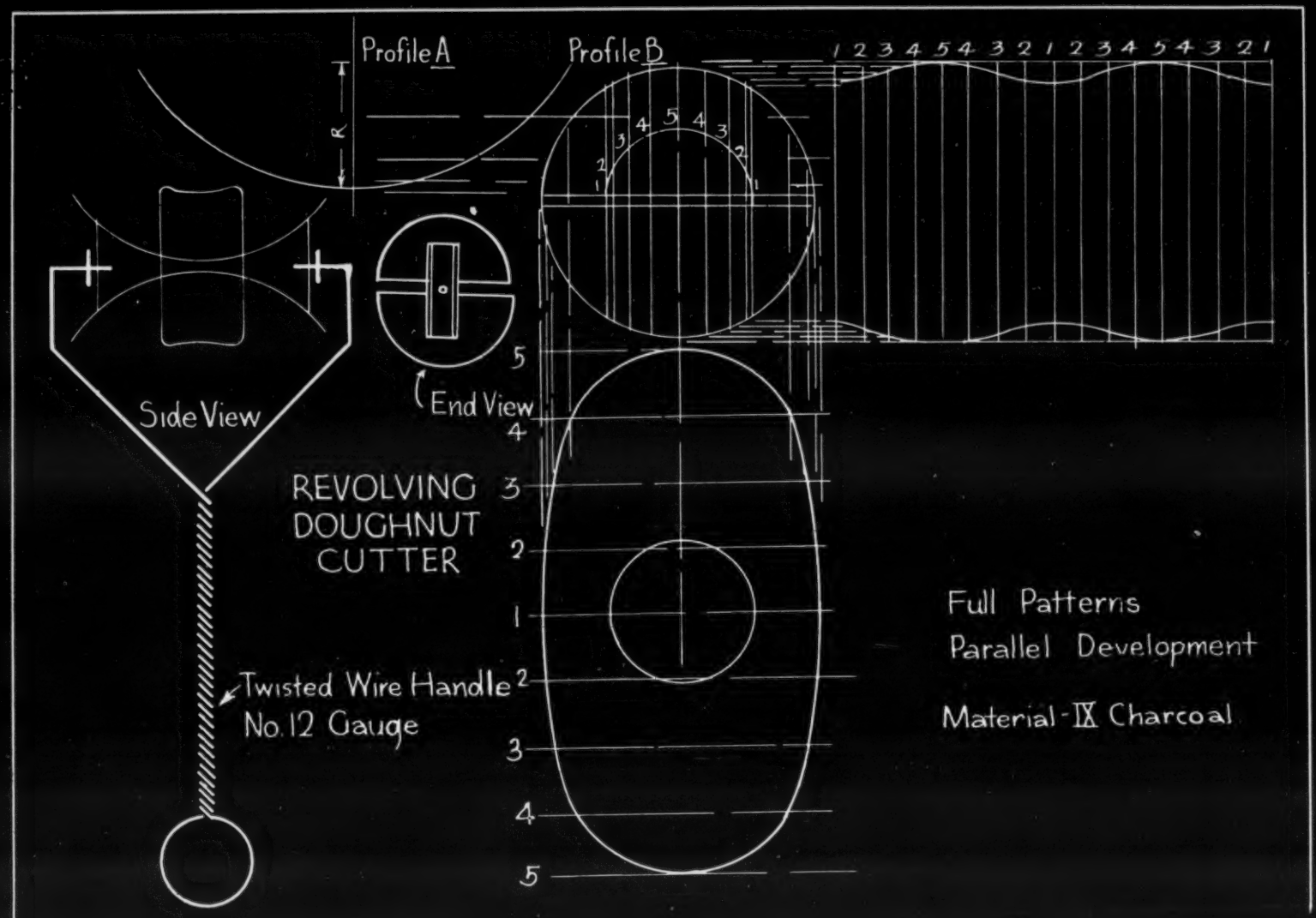

HANDY BOX CONSTRUCTION
Side
Bottom
½" Double Seam allowance
Side
Layout for Bottom and Sides
Hinges
Top View (Corner)
Hasp
Wire Allowance
Cover
Hangers for Tray
Cross Section
End Layout


Profile A
Profile B
T
R
1 2 3 4 5 4 3 2 1 2 3 4 5 4 3 2 1
Side View
End View
REVOLVING DOUGHNUT CUTTER
Twisted Wire Handle No. 12 Gauge
Full Patterns
Parallel Development
Material - IX Charcoal

How to Look at a Plant

We should learn to look at a plant somewhat as a botanist does—to discover the marvels of plant life. Also, we should look at it as an artist does—to find beauty of lines, form and color. And above all we shall now look as the designer does—for simple details that we may adapt to many uses. Thus we make the acquaintance of an individual plant, learning the characteristics that distinguish it from other species. The farther the acquaintance is carried the more we find of interest, beauty and value.

Selecting a Specimen to Draw

It is best to choose a simple specimen that shows a few of the interesting facts we have learned of this plant friend. Our drawing will be better, and the details more usable for designing, if our specimen is not too complicated. We cannot tell everything in one drawing so we shall tell a few things as well as we can.

A Practical Drawing

The pencil outline drawing has proved to be one of the most practical methods of recording design material. A good plan to follow is this:

First: Study the lines of growth and indicate with long swinging strokes.

Second: Sketch in the forms.

Third: Finish with a clear-cut outline.

A few dark accents, suggested by shadows, or by dark colors in the plant may sometimes give added value. An outline drawing is rather conventional and leads, naturally, to decorative treatments and arrangements much better than does a more naturalistic representation.

A Design Vocabulary

To make a study of design we need a simple design vocabulary—an understanding of the words best express the principles of beauty. The Greeks considered the elements of beauty to be: balance, symmetry, rhythm, harmony, and unity. In this series of plates and exercises we shall endeavor to give the student an understanding of these terms, and some definite methods of applying these principles.

Balance is an equalization of weight or attractive force.

Symmetry is likesidedness or similarity in reverse order.

Rhythm is movement with regular accents, or with gradation.

Harmony is the adaptation of parts to each other.

Unity is organization to form a complete whole.

Balance

There are two kinds of balance—formal and informal. Informal or occult balance is not as evident nor as easily attained as formal balance or symmetry. Balance is a principle of composition to be seen in every famous picture and it should apply as well to our simplest drawings and designs. Plate 1 shows informal balance. The plant is at one side, facing, as it were, toward the center. The two detail drawings equalize the weight by adding their attractive force to the other side.

Symmetry

The easiest and surest way to attain balance is by making the two sides alike. This is symmetry and is illustrated by the bi-symmetric units in Plate 2, B to I.

Bi-Symmetry

Fold a piece of paper and on the fold cut out a simple form suggested by the flower, Plate 2, A. When opened and laid on a dark surface this shows a form with the two sides alike, B. This is formal balance. Fold a strip of paper and cut quickly a number of variations of the same idea. The general form may be sketched with pencil or the cutting may be done entirely freehand. Each trial will suggest another, and from a number of them a few will surely be good. Bear in mind always the idea of simplicity, eliminating details and irregularities. The scissors aid in making simple curves and straight edges. Sometimes the part cut out makes an interesting unit, as B, and sometimes the enclosing piece makes an excellent stencil, especially if it has the little connecting straps between parts as in C, F, etc.

Rhythms

The unit may be repeated by laying the little stencil on a piece of drawing paper and rubbing across the opening with pencil or crayon, D, or by outlining the space, E. Several of these repeats placed at regular intervals create a rhythm, J.

To cut a border fold a strip of thin paper and cut a form from each folded side as shown at K. If one form is larger than the other this will make a border rhythm with regular accents of large and small units, L. This is a more interesting kind of rhythm than J because this plan usually produces more movement than bi-symmetric forms of one kind alone. The student will find great pleasure in cutting simple balanced units, thus creating new forms; and in combining them in different ways for borders.

Tri-Symmetry

This three-petal flower suggests the use of the three-part fold for cutting a design. Fold a square piece of paper in half, then in thirds as at M, and cut half a petal as indicated at N. The result is a figure with three parts alike, O. P, Q, R, S, and T are a few of the many forms suggested by the flower.

U shows a bi-symmetric floral design for an initial plate. The design was cut in light blue paper, pasted carefully onto a piece of dark blue and mounted on the cover of a book for flower drawings.

Cooperation Through Block Printing

Solon R. Barber, Logan High School, Logan, Utah

PROBABLY the most distinctive and significant thing a department of instruction in the average American high school is privileged to do, is to put into effect some plan by which the work of that department will become so closely coordinated with the activities of other divisions of the school, as well as becoming so valuable in the general educational scheme of the course, that its *raison d'etre* will become unquestioned.

This, the art department of the Logan high school, Logan, Utah, has succeeded in doing through the introduction of a small hand press, materials for linoleum block printing, and competent instruction in the technique of this art.

(It should be written here, incidentally, that the department here referred to gives several courses in art. The block printing is merely a part of a very complete course in arts and crafts. Courses in design, drawing, sketching, painting, mechanical drafting are also given. All of these have unquestionably contributed to the usefulness of the department's work, but this I know: The most distinctive part of the department's work during the past school year has been its block cutting and printing and the peculiarly indispensable place this work has come to take in the scheme of things at Logan high school.)

The writer had watched with interest the cooperation of the art department of the Logan high school with other divisions of the school before he determined to interview the department head, Mr. M. D. Robison, Jr. The writer had seen clever posters, designed and painted by students in the department, appear in the halls of the school. He had seen excellent little place cards, made in the department, in use at high school social functions. He had received Christmas cards designed and executed by the students, and printed in the department. He had been appreciative of the cooperation of the department with the high school yearbook and newspaper.

Going to the office of Mr. Robison, the writer asked: "What is the process you use in this work? What materials do you use? Can the average student do it? How much does this work cost in equipment and supplies of all sorts? What is its educational value? To what extent have you cooperated with other departments of the school? What are the possibilities of this kind of work, educationally?"

Mr. Robison said: "In the block printing process, we use a heavy, battleship linoleum mounted on a three-quarter inch wood block. These blocks are cheap and may be purchased at many supply houses. However, we occasionally make them ourselves by merely gluing the linoleum to the wood blocks.

"The design is carefully worked out, remembering that, if the blocks are to print well and if they are to stand up under a large number of impressions, the lines should not be too fine. There is one exception to this: when the line is to appear in white. The ordinary pen and ink sketch is mainly white—the lines in black composing a smaller proportion of the entire surface than the white of the paper. In the case of our block prints, you will find the contrary to be true. The part we cut out appears as white on the finished printed reproduction.

"The design is traced in reverse, with any impression paper. The part that is not to print is cut away with a small gouge. This gouge should be sharp.

"The printing may be done with very limited apparatus. A small printer's brayer and tile are all that are absolutely necessary and the equipment we have in the department will print a surface up to eight inches square. Or you may do the printing by one of the Japanese methods. You place the completed block face up on a table, ink in the color desired, and place the paper upon the inked surface, rubbing it gently with hand or thumb. This leaves the impression. Our press is a small, hand affair made by the woodworking students."

"Are these blocks suitable for use in an ordinary print shop?" I asked. "Would they stand up under several thousand impressions for use in a school yearbook or school paper? Will they print well if ordinary newsprint or book paper is used?"

"Contrary to a general belief, they will," declared the head of the department. "The Logan high school newspaper has used them several times. Of course, you question their durability in use when from five to ten thousand impressions are to be made?"

I agreed that I did; for we had used them in the special Christmas issue of the school paper with splendid results. We are planning to use a book plate printed in the department for the school annual.

"Properly cut blocks will take as high as thirty thousand impressions," said Mr. Robison.

"Is this method suitable for color printing?" I inquired.

"The method may be successfully used in any design having a rather heavy mass form, when worked up in rather heavy lines. They are especially effective when printed in color. In color printing one uses a separate block for each color," Mr. Robison explained.

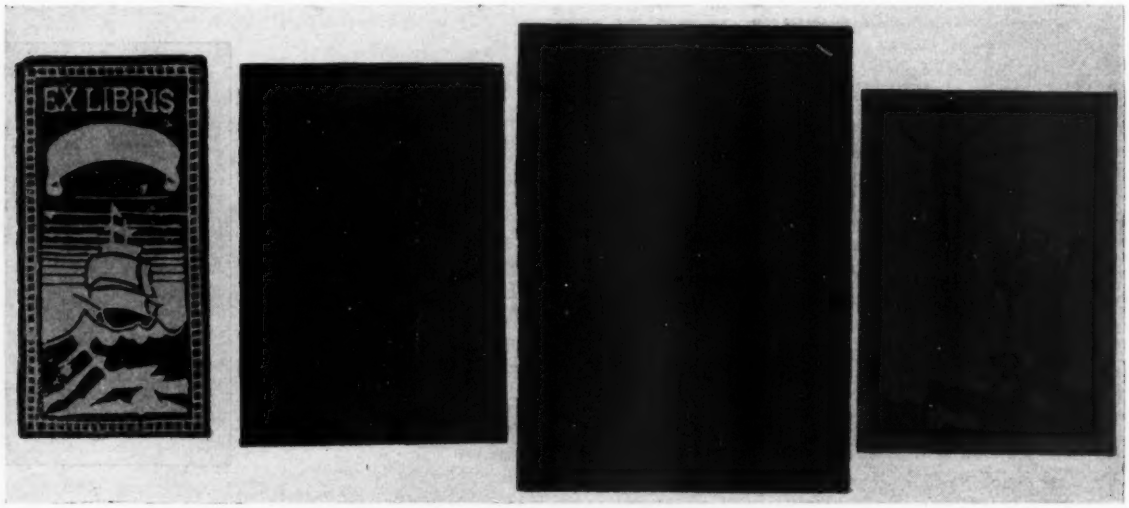
"Must you have experienced students do this work?"

"Every single one of the students in the department, who are now doing block cutting, were inexperienced at the beginning of the school year in September, 1924. Most of them had probably never seen block printing. Certainly few of them knew definitely what it is."

Mr. Robison showed many samples of block printing, in colors and in black and white. I knew personally that the blocks would print well in newspapers and had found that they were suitable for the ordinary flat bed presses used in the establishments of small newspaper-publishing houses. The blocks were type high and fitted in excellently in the forms used in printing our high school newspaper. We plan to paste color prints, designed and printed by students, in our 1925 annual.

"To what extent have you cooperated with other departments of the high school and with organizations in this town?" I asked Mr. Robison.

"Well, you know some of the ways," he said. "We made Christmas cards for the local chapter of Rotary International, printed in their official colors. Our students also made Christmas cards for their own use and



TYPICAL ONE AND TWO-COLOR WOOD BLOCK PRINTING JOBS DONE IN THE LOGAN COUNTY HIGH SCHOOL.

WOOD BLOCK DESIGNED AND PRINTED IN THE JAPANESE MANNER BY A STUDENT IN THE LOGAN COUNTY HIGH SCHOOL.

for the Cache Valley Council, Boy Scouts of America. You know that we are printing an ex libris plate for the high school yearbook, 'The Amphion.' You have used our 'cuts' several times for the high school paper, and the blocks were used especially for an athletic issue and for the special Christmas issue. We printed cards advertising the high school opera which were mailed to each home in Logan. When the Logan junior high school held their electoral campaign for student body officers, we printed tags for them. The book plates seen in the books in the chemistry department reference library are the work of students in the department. In addition, the students have issued a departmental yearbook, a copy of which is going to each high school in the state; have printed dance programs, tally cards, place cards, letterheads—showing that the process, aside from its high decorative value, has rather considerable commercial value as well. One of the students designed and cut a block which will be used to illustrate an article written by a prominent educator of the city which is to appear, I understand, in a coming issue of a national educational periodical."

This art department has cooperated with every department in the high school in one way or another. Block printing is only one of the sources of this aid. All

PART OF A LINOLEUM BLOCK CUT FOR USE ON A CHRISTMAS CARD.

of these blocks were designed and cut by students in the department. In addition, the students had painted posters, portraits, scenes, scenery and other things which found places in one or another of the multiple activities of a busy high school. Just at present the students are receiving training in making the paints they use, carrying the process through from raw materials to finished product.

Thus an incentive to good work has been ever before the students in their work. They have known that their work would be seen by the public, because it had value to the public. It appears that the work of this department has had high educational value and that the work of the students has possessed worth in unselfish public service.

THAT USEFUL FIFTEEN MINUTES

C. W. Stone

Mr. School Board Member and Mr. Teacher—did you know there were things the children should be learning that cannot be found in books? Calling upon the heads of schools as well as upon members of boards, I found in Illinois, but eleven schools that were taking advantage of a very simple way in which to secure some of this additional knowledge.

What do I mean by that—well, in a small town in the southern part of the state, I arrived at the school building and was directed toward the door of the eighth-grade teacher. Stepping quietly into the rear door of the room, I found a man lecturing to the children. He had several bits of leather and an old shoe which he was talking about to the children. The speaker watched the clock closely, and soon hurried forth to another grade.

Very curious as to what this was all about, I waited until the intermission and had matters explained to me. Each teacher had been allowed to read fifteen minutes to the children each day. The board had struck a new idea of obtaining the various business men to talk about their own line of work to the children, spending that fifteen minutes to a better advantage.

One of the board members had gone to the druggist and still another to the coal dealer. Still another had gone to the local electrician. These speakers rendered their services gratis and the children gained worlds of knowledge from these practical and experienced men that could never have been gained from books.

The teacher gave all the thanks to their wonderful school board for these most inspiring talks. She stated that she alone, had learned more that afternoon in that brief fifteen minutes about leather and its care and about the composition of a heel than she would ever have learned otherwise. The children took these thoughts home with them to their parents and the services rendered by these speakers rendered one hundred per cent returns.

So it was regarding coal—the children had learned about the different kinds of coal but somehow those facts just hadn't stuck in the children's minds but when the coal dealer brought samples of coal and told them about each one and passed them about on a tray, coal took on a different meaning.

The doctor, the dentist, and even the jeweler had been included in the lectures and the mission had proved a huge success in the school. The teachers seemed as pleased as the children. The members of the board sometimes came to hear these lectures to be sure the speaker was keeping within bounds of an educational talk, but so far they had discovered no infringers.

This condition existed in ten other schools upon which I call annually and in each case they owe their debt of gratitude to the board of education and its live members.

Could you find a better use for that fifteen-minute period? Could you improve the situation? Which would be more beneficial—one of these minute men or fifteen minutes spent on reading some bright bit of fiction to the children?

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

SCHOLARSHIP

We attended a meeting of archaeologists and artists recently. They were all artists in the use of language for each speaker, intent on his subject, made it appear important whether it was concerning the identity of a fragment buried for centuries, or the interpretation of life and beauty in a masterpiece.

Of course comments were made at times which exposed the peculiar bent of the archaeologist, who conceived it of great importance whether a relic was made in one century or another, and by one more or less mythical artist or another. It was also evident that the archaeologist is often more interested in exact chronology than in beauty or fine design. They discussed at great length the origin of some very ugly relics of sculpture that seemed of little importance to the artist.

Scholarship to them, seemed to the artist a keen intuition for identifying on slight and obscure evidence the facts of history. In place of taking delight above ground in the beauties of nature, they seemed to take great delight in digging into the earth and finding the footprints of buried races of people.

It is needless to say, that the program was resplendant with scholarly titles. Great schools for some reason seem to place the badge of scholarship on the one who can supply a missing link in the chain of history. Is it not probable that the great men of today, as the great minds of the past, will go down to their graves without academic degrees? Great artists, great musicians, even great inventors who leave a heritage to future generations will, in all probability, be known as without academic degree.

And yet, as a result of this modern scholastic inquisitiveness, we know more of the Egyptians, Cretans, Greeks, Romans, than any one of these races knew of their immediate predecessors. The chain of history is linked up for our inspection more completely than ever before in the history of man. This revelation of the past has helped us much in shaping our own lives, for intelligent action is based very much on precedent.

Even our boys and girls, who seem to care little for precedent, have a hazy but helpful impression of the past. Often contemptuous of the past, they become less sophisticated when they learn that the socalled dark ages held records of achievement that have not been broken.

There is no more important maxim than "know thyself," and the human knows himself only in terms of those who have lived their lives. We should have respect and no little gratitude for the be-spectacled antiquarian scholar who discovers us to ourselves out of the socalled dark ages.

A BLOW TO VOCATIONAL EDUCATION IN TEXAS

The progress of vocational education in Texas and in the whole South has been given a severe blow by the veto of Governor Ferguson of the biennial appropriation for Smith-Hughes and other vocational work in the Texas elementary and secondary schools.

The reason given for the veto was the Governor's opposition to Federal appropriations for good roads, vocational schools, and other projects. But the reason does not seem adequate when it is considered that the Governor has done nothing to provide for the type of instruction which is to be cut off for two years, despite her expressed interest in increased support of the common schools. Shop work for boys, household arts for girls, vocational work in general, are pretty well established parts of the common schools in this day and age, and to cut them off is to correspondingly injure the common schools, and the service they render to the children of the common people.

If Governor Ferguson believes that she is practicing economy by reducing the taxes paid for vocational and shop work, she has been misled in her understanding of the true economies of the situation. Texas will pay many times over the saving which it is now making, in the adult efficiency of the young folks who are now denied the instruction they need.

A TIME FOR EVERYTHING AND EVERYTHING ON TIME

The time element is far too little considered in all of our school work. Too often a student's work is simply judged and graded on the apparent quality of the finished product without regard to the time involved in doing the job.

Perhaps the greatest need in the world to-day is to have the right thing done at the right time, with a definite accounting of the time element. A great teacher was fond of saying that he could play a piano as well as anybody, if he could get the right finger on the right key at the right time.

The tendency to disregard the time element in school is out of harmony with the methods of industry and leads to bad habits and fatal consequences. There is many a task in the modern industrial life that depends almost wholly upon the time element for its value. Almost the whole problem of production revolves about the idea of producing a certain result in a limited time. Indeed, a large part of the problem of education lies in the attempt to teach in a limited time what the student might acquire for himself if given an unlimited amount of time. Nearly every advance in the manufacture of modern tools and machinery has been in the direction of the economy of time.

With the whole modern program of industry and business based quite largely upon the time element, it would seem unfortunate if the schools should fail to take this important element into account in their daily methods and practices. It would not be an unreasonable thing to say that boys have been known to loiter through a semester or a year on a small and insignifi-

cant task that should have been completed in a month. The serious part of this situation is that frequently the quality of the workmanship judged from the finished article seems quite good. Hence, a fair grade is often given for work that has simply been done on a loafing basis with no accounting of time and no consideration of what could have been done in the time devoted to the project. It would seem, therefore, that workmanship or quality of effort should be conditioned upon the time involved. Each boy who is confronted with a task should also be confronted with a time scale—a kind of standard or norm of the time reasonably considered necessary for the performance of such task.

By some such method, a tremendous impetus could be given to the interest among students in the performance of their work according to a time schedule. Furthermore, a tremendous saving of time ordinarily wasted would be brought about. When this is done, it will be reasonable to expect students to develop respect for time and a pride in work done on schedule time.

If proper consideration for the time element in school work did nothing else than develop a sense of time values and a pride in work done on a productive, workmanlike basis, it would justify every reasonable effort necessary to achieve such a result.

THE LATE LAMENTED

It seems to have been decided at the recent meeting of the National Society for Vocational Education to abandon the publication of the Vocational Education Magazine. Some rather heavy liabilities, we understand, fall upon those who have sponsored and promoted this publication. It was inevitable from the start that this undertaking should fail. It had a field and a purpose which were already occupied and met by other well established publications.

The appeal that was made for the Vocational Education Magazine was not based upon considerations of merit and of service rendered. It was based largely upon an artificial notion of organization loyalty. Furthermore, the false issue was raised of the "professional" magazine versus the socalled "commercial" publications. Strangely enough, the magazine was produced and largely financed by a commercial publishing house and keen and most vigorous competition was attempted for advertising in the commercial fields. Since the magazine was put out by a commercial publisher and commercial advertising was sought in competition with the socalled "commercial" magazines, it was just a little difficult to discern any peculiarly holy and professional merit that would justify subsidizing by the vocational organizations.

To point a moral, we venture to offer the following observations for the benefit of any who find it increasingly difficult to secure a ready market for their writings and speeches: It costs money to establish a magazine. It requires some training and experience to run one successfully. A magazine must in the long run stand or fall on the merit of its editorial policy and material. Unwilling subscribers are but little strength to a publication.

There still remain the tried, proven, and successful magazines that have won their way by merit and service alone in the field of industrial arts and vocational education. Their pages are still open, as they have always been, to *anybody* who has anything worth while to say.

VOCATIONAL GUIDANCE IN RURAL LIFE

"In guidance, as in everything else in education, the country boy and girl still loses out," recently said W. Carson Ryan of Swarthmore College.

"We continue to neglect the country school, forgetting that half our nation is in the rural districts. At the present time most of the evils in the cities, that led to the urban guidance movement a few years ago, are still in the country.

"Take early school-leaving, for example. The campaigns for staying in school have been fairly successful in the cities. In many progressive school systems the youngster who would leave school as soon as the law allows finds a number of friendly agencies to help him work out his further education in the most helpful way. In the rural schools, on the contrary, early school leaving goes on despite all that conscientious teachers can do to prevent it. Such organizations as the American Legion on the one hand and the business and professional women's clubs on the other agree that a high school education is the least possible equipment for modern citizenship or modern business, yet all over the country there are so-called "business schools" luring country girls of sixth and seventh grade schooling into alleged commercial courses of a few months' duration as preparation for a business career!

"The first thing we can do about it is to show up such situations as this. Public opinion should be so strong against predatory commercial schools of the type mentioned that boys and girls eager to get into business by short cuts would be safeguarded at every step. Then we can equip the country school teacher with the material that good city teachers now have on guidance, including the facts about the dangers of early school-leaving. Somehow we must help the rural teacher to get over to her community the conviction now widely accepted in the cities and towns, that the parent in this day and generation who allows his son or daughter to leave school without going to high school is committing a crime against his child's future.

"But the fundamental thing we shall have to do, in rural educational and vocational guidance or in any other phase of rural education, is the one thing we have so far refused to do in this country—make it absolutely certain that the boy or girl in the rural districts shall have just as good school buildings, just as good teachers, just as good educational provision in every way, as the boy or girl in the city or town. We are still obsessed by the notion of size and wealth. We assume, without any warrant, that teachers must always be paid lower in smaller and less wealthier communities, forgetting that all these children are to be citizens of a common nation with equal right of participation in the making of our civilization. Real educational progress will never come in the United States until we surrender completely this notion that size and wealth are the determining factors and make up our minds to see that every boy and girl, whether in city or country, shall have access to the best possible education our age can provide."

No man can tell what the future may bring forth, and small opportunities are often the beginning of great enterprises.—*Demosthenes.*

Little Arguments on Great Principles

ACCURACY IN ART

"Ah me!" sighed Mr. Frills, the teacher of Art, as he blue penciled the perspective drawings of his morning class with a deliberation that exasperated the energetic Mr. Try Square, who sat at his desk in prim disdain of all things sentimental.

"Ah me! I sometimes think we might return with advantage to the old time routine of drawing triangles, squares, circles, cubes, cylinders, cones, and polygons that have now been sent to the educational attic. These youngsters of mine are so reckless with direction, that I wonder if they can find their way home from school."

"Right you are for once!" snapped Try Square. "Our schools have become so devoted to self-expression and individuality that they neglect truth and accuracy. Our pupils seem hardly to know straight from crooked when they see it, and without standards of direction, size, time, and space, how can they consider dimension?"

"I was not thinking of mere accuracy or dimensions," protested Frills. "Of course we expect inaccuracy and even carelessness as a natural evidence of youth.

"As for truth, I suppose even truth like righteousness has different standards for each of us. Consistency is a jewel, but is uncut as applied to the education of youth. I question whether we shall ever be able to cut the facets of our educational jewel to perfect accuracy or dimension. To reduce education to a formula would be to find that formula applying to a very small part of our class."

"Would it?" questioned Try Square. "I am convinced that boys and girls are near enough alike to need thorough training in fundamentals. They eat, drink, sleep, and breathe alike. They grow physically by the same process, why not mentally?"

"Well!" drawled the temperamental Mr. Frills. "That is a question we must refer to the psychologists I suppose. Until they can convince me that there is a common process for the mental development of the variety of youngsters I find in my classes, I must discriminate between Mary Sweet and Johnny Wise to bring out the best that is in each of them.

"Mary violates every law of perspective without malice or forethought, but she makes the prettiest designs for hats and gowns that I have seen outside of Paris. Johnny draws so infernally straight and accurate that he must be a cubist, but his drawings mean nothing but a careful placing of lines, angles, and sizes."

"You art teachers do have your peculiar troubles, Mr. Frills. Suppose you reverse the process and give Mary Sweet some of the problems that are so easy for Johnny and give Johnny some hats and gowns to design."

"Now, Mr. Try Square, you are having your little joke at my expense. How could Johnny be made to design hats and gowns when he scarcely dares to look at one, and how could Mary draw and design geometry when she refuses to think or care about direction or dimension?

"No! Mr. Try Square, we must adapt our school work to the interests of our boys and girls as far as may be possible under the present school program of forty pupils and forty minutes, and hope for the millennium."

Keeping Body Type Faces Where They Belong

L. F. Knowles, Instructor in Printing, John A. Johnson High School, St. Paul, Minn.

Between twenty-five and thirty years ago the writer was a full fledged "printer's devil" in a small country office. The proprietor and editor of the paper was a crank on some things, as most proprietors, and some editors, are even in this enlightened day and age. One of friend editor's indoor sports was to make life miserable for any compositor who did not keep his spaces carefully sorted and where they belonged. You could "get by with murder" in almost any other thing or way, but let him step up to a case to set type and find a few spaces out of place and there was a merry time in store for the luckless individual who had to admit that he was the chap who distributed in that case, said chap generally being myself.

My wife sometimes quotes for my special benefit: "We become like those with whom we associate." That may be. I am not going to argue with her. Any of my married readers will know why. But just the same I learned to keep my space boxes clean while I was in that office. Now that I am teaching printing, I find that I, too, am something of a crank on the same subject.

Since beginning to teach printing, I have found that most of the trouble with students keeping spaces sorted centers around the same difficulty that I had many years ago. The pivot around which the trouble swings is the four-to-em space. There is no great difficulty to get students to distinguish the difference between the three-to-em spaces, five-to-em spaces and the hair spaces. But when he tries to tell the difference quickly between a four-to-em space and a three-to-em space, or between a four-to-em and five-to-em space without comparing them, the new student is getting into deep water and the first

thing the teacher knows he is out there himself, though it is hot water for him. The usual practice is to let all concerned wallow around in any of the space boxes where the particular size is supposed to be kept until what is needed is found.

One day I went home from that office practically fired because of the space hoo-do. I told my troubles to grandfather. He not knowing a space from a wagon tongue said: "Well, why don't you mark them? I'd paint 'em red or something else if they were giving me trouble like that." He resumed his reading and I crawled off to bed, but not to sleep. I lay awake long after the sand man had usually made his rounds. I was thinking. That was Saturday. Sunday morning I climbed out of bed early, borrowed my grandfather's round-pointed marking gauge and went back to the office. I set up line after line of those four-to-em spaces against my composing rule and put in a en-quad at the right hand end of the line, put in a piece of pica reglet that I had previously split narrower with my knife, took the marking gauge and sliding it along the top of my composing rule scratched an extra nick in those troublesome four-to-em spaces. Each line of spaces was dumped out on the imposing stone and every one gone over carefully and any burrs carefully trimmed off. I fixed up every space in the office that I could find and went home about three o'clock in the afternoon. Needless to say I never had any more trouble with the spaces being mixed up, though you note that I am not writing what the boss said after he found it out some weeks later. Since then I have used the same scheme with equally good results in training apprentices who have happened to come under my charge. Some ten or twelve years ago I introduced the idea into a school printing class. I am using the same idea today, though I no longer have to nick my own spaces with a marking gauge.

Today some type founders cast spaces without any nicks at all. In that case get every four-to-em space out of the cases and throw them in the hell-box if necessary. Buy from any type foundry new four-to-em spaces that are nicked. They can be nicked to order at a slight additional cost if necessary. Your space trouble will be over after your students know that you mean business about having clean space boxes.

As I have said before, there is no trouble to tell the difference between a three-to-em and the five-to-em space, because of the difference in thickness. The distinguishing nick marks the four-to-em space.

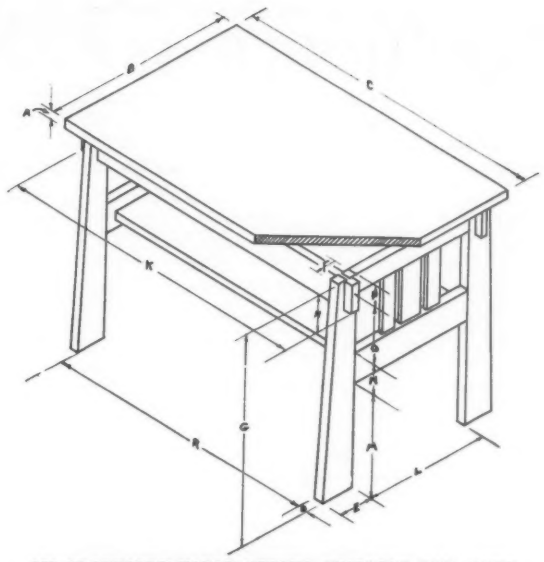
I am now carrying out the same idea, to some extent, in the job fonts of my shop, though here, owing to greater variety of spaces sometimes found, it may be necessary to mark more than one size of spaces. In that case mark each one differently.

Don't spend your time scolding the boys for having mixed spaces. Mark them. They can always see the different nicking if they are not sure, and after a few weeks or months, they will forget all about the nicks and put the spaces where they belong anyway.

AN ADAPTABLE TABLE DESIGN

N. C. Tock, Wellsburg, W. Va.

A few years ago we were unable to get any two-inch lumber for table legs. We tried gluing two pieces of one-inch material together, but these glued up legs were too hard a problem for some of our boys to handle as the grain would not always run in the right direction and at times the glue broke loose under the strain of fitting mortises. It was up to us to make tables of one-inch material. The drawing illustrates the outcome of our planning. This type of table proved so popular that it was quickly modified in dimensions and put to a large number of purposes, some of which are given in the table of dimensions.



AN ADAPTABLE TABLE DESIGN, SUITABLE FOR MANY PURPOSES AND SIZES.

This style of table is light in weight and still is strong enough to be rigid. It can be handled more decoratively than the drawing suggests. Rails and legs can be chamfered or shaped. The slats also admit of various treatments. It is easily made into a knock-down table for ease in packing or crating. The slip joint shown in the front corner, where the top is cut away, can be held in place with screws instead of with glue. The top is fastened on with strips and screws from the under side. By taking out a half dozen or more of screws the table will resolve itself into a number of flat units which can be packed into small space.

When getting out stock for the legs cut a piece equal in width to the top of the leg plus the width of the bottom of the leg plus a half inch for planing. Square up this board and saw at a slant lengthwise, thus making two legs at once. Assemble the ends and plane the surfaces of the legs flush with the surfaces of the rails.

For use as a radio table the shelf should be wide enough to hold the batteries. Its position can be changed to admit of placing a larger battery on it. For use as a typewriter table include a drawer in the front. Make this drawer large enough to hold standard letterheads. If used for a davenport table, shape the legs to a graceful curve and shape the shelf to match. We usually assemble the shelf and table ends with screws but dowels make a better looking job.

Another advantage of this table is that it works out well when made of softer woods, such as cypress, butternut, or gum.

Dimensions Suitable For Various Purposes

	A	B	C	D	E	F	G	H	K	L	M	N	O	P	R
Library table	1¼	30	54	1½	4	3	29	5	52	20	13	4	8	4	47
Writing table	1	26	42	1	3½	2½	29	4½	40	17	13	4	8½	3½	38
Radio or Typewriter	¾	20	30	¾	3	2	26	4	28	14	14	3	7	2	26½
Davenport table	¾	18	60	¾	3	2	30	4	56	12	13	2½	12	2½	54½
Stool	¾	12	16	¾	2½	2	17	3	15	7	5	2	13	2	13½

Reimbursement for Vocational Work. The schools of Lansing, Mich., have received $6,786 as reimbursement for vocational work carried on during the past year. A total of $717 were received for salaries of teachers whose work in home economics and related subjects had been approved by the state education department.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, pattern-making, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

THE ORANGE CRATE AND MANUAL TRAINING FLY TRAP AND CRICKET CARRIER

C. Anthony Van Kammen, Grand Rapids, Michigan

The fly trap is not a new idea, for it has appeared in many magazines and in as many sizes and designs. However, the use of an orange crate for the lumber material I believe to be new. This little discarded carrier serves well as a cheap source of lumber supply.

One orange crate and a yard of 36" wide fly screen will make two fly traps. Other materials necessary are a box of 4 ounce tacks and a small quantity of 5/8" box nails. Either black, galvanized or copper screen may be used, the latter two of which make exceedingly attractive products with the wooden frame painted or enameled a bright color. Completed traps have sold for seventy-five cents and a dollar and found a ready market when well constructed.

Placed where flies frequent, and with a dish beneath containing bait that will attract them, the trap will prove a great success. A good location is near a screen door or where passersby will continually disturb the flies so they will fly upward through the opening in the trap. A baker had two traps near the entrance to his shop where they attracted much attention because of the daily "hauls." When it is necessary to clean the trap, live flies can be killed by blowing a small quantity of insect powder through the screen, after which the contents can be removed by means of the capped hole in the top.

The design shown is very simple and makes an excellent seventh grade project. It is equally interesting as a home problem. From one of the orange crate ends cut the piece for the top 9" square. Make eight strips 5/8"x5/8"x11 1/2" or the length of the crate end. Use four of the 5/8" square strips for legs, but nailing one flush with the edges at each corner. The stretchers for the lower part are made so that they will fit snugly between the legs adjacent to the top. They are then nailed 1" from the bottom ends between the same legs for which they were fitted. (See Figure 2.) By inserting the stretchers near the top the worker is sure that the legs will not be spread apart or be drawn in at the base of the trap when they are nailed in their proper location. Drive the nails slightly slanting so that they will cross the end grain and hold the work together more firmly.

The frame is now ready for painting which must be done before the screen is attached. The upper and lower edges of the screen are covered with strips of 3/16" stock made from thin crate material. See working drawing, Figure 1. Some of this material comes dressed while not a small quantity comes rough sawn, in which case one surface should be planed. Use the marking gauge to slit the strips to approximate sizes, scoring on both sides of the stock, after which plane to exact width. For the upper part the band is 1" wide while the lower cover strip is the same as the stretcher or 5/8". Like the frame, this material should be painted before it is applied, to avoid smearing the screen. The newly sawed ends of the strips, made when fitting, can be "touched up" with a little paint and a small brush when the job is completed.

A pattern for the pyramid shaped screen is cut from paper or cardboard as shown at the right in Figure 1. With the pattern laid under the screen draw around same with chalk and cut on the lines. The corners may be formed by creasing, as shown by the dotted lines, over the sharp edge of a piece of wood. Sew the seam formed in shaping the pyramid shaped part with a strand of screen wire. The exterior covering is formed from a strip 10 1/2"x36". Crease or bend sharply forming four 9"x10 1/2" rectangles. Get an orange crate and a yard of

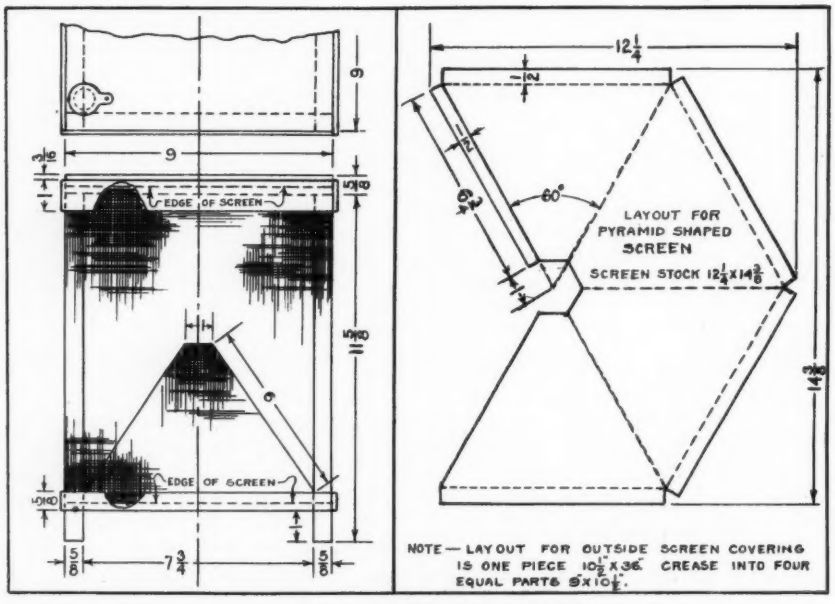

9
EDGE OF SCREEN
EDGE OF SCREEN
7 3/4
12 1/4
60°
LAYOUT FOR PYRAMID SHAPED SCREEN
SCREEN STOCK 12 1/4 X 14 3/8
NOTE — LAYOUT FOR OUTSIDE SCREEN COVERING IS ONE PIECE 10 1/2" X 36". CREASE INTO FOUR EQUAL PARTS 9"X10 1/2".

FIG. 1. DETAILS OF A FLY TRAP.

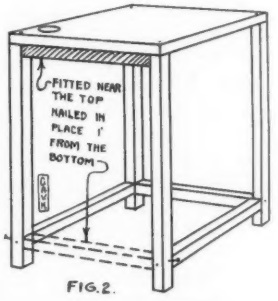


FIG. 2.

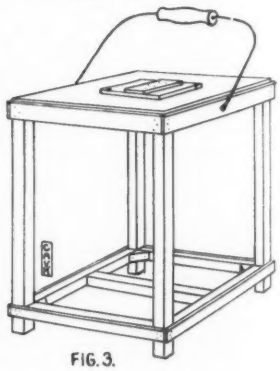


FIG. 3.

screen. Make two traps and help eliminate the fly nuisance.

When the fishing season opened, the author in search of a suitable receptacle for collecting, carrying, and keeping alive while in captivity, crickets for immediate and future fishing trips, conceived the idea of using one of the above fly traps. A bottle or fruit jar serves the purpose after a fashion, but not very many crickets can be carried and there is the added problem of proper ventilation to contend with. Boys could make money selling crickets from a receptacle as indicated, because all through the summer the author's goodly supply was in demand by other fishermen who "ran out" of bait and asked to purchase crickets while on the lake. You all know how it is when the fish are biting. Small crickets caught and placed in the carrier with a bit of dead grass and a few leaves for a cover, thrive well, and in a few weeks may be fattened up into nice sized bait by feeding them bits of fruit, such as apples, pears, plums, mellon rinds, etc.

The construction of the cricket carriers is the same as that of the fly trap and is of the same dimensions and material. Since the crickets like to hide on the under side of the cover near the edge, the hand hole is best placed in the center of the top. A piece of sheet metal or a square ⅛" stock from an orange crate large enough to cover the hand hole and pinned at one corner by a nail closes the opening as desired. The ⅛" square should be strengthened by a piece nailed across the grain, and helps to serve as a handle for easily sliding the cover or lid. To prevent swinging the cover past the hole a second nail is driven in as a stop. The pyramid shaped screen in the fly trap is replaced by a square piece of screen that will enclose the bottom. As a reinforcement, a ⅝" square strip is nailed across the center between two of the bottom stretchers. A small "V" shaped block ⅝" long should be nailed in each corner where the stretchers meet. The bottom screen, which measures 9"x9" with ⅝" squares cut from the corners for the posts is nailed on the upper side of the stretchers. In this problem it is evident that the bottom screen would have to be nailed on before the side screen. The screen could be nailed on the under side of the stretchers, but this would make more corners to keep clean inside the carrier and there is the added danger of pushing the bottom screen out. The handle from a candy bucket serves admirably as a means of transporting the carrier. The completed frame, without screen, appears as in Figure 3.

A CLAMP RACK

Charles W. Frost

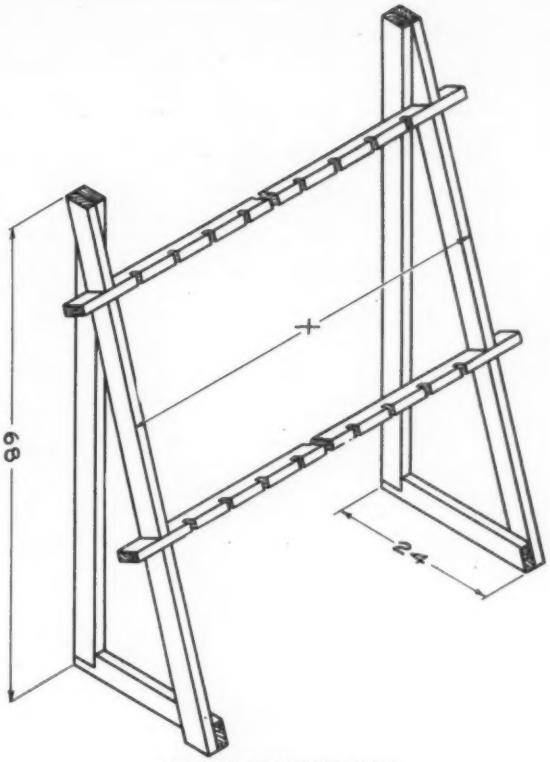
This rack serves the purpose of holding the steel bar clamps in a neat and business-like order, and eliminates the excuse for the unsightly and insanitary accumulation of dust, shavings, and miscellaneous trash usually found where clamps are kept stacked on the floor in a corner of the shop.

The various parts of the rack are fastened together by means of end-lap, cross-lap and butt joints reinforced with lag screws and carriage bolts.

The horizontal bars (upon which the clamps rest) should be of hard wood but where this is not available, the danger of soft wood splitting from one notch to the next can be minimized by inserting hardwood dowels through the bar from front to back on each side of each notch.

The clamp rack should be fastened to the floor and to the wall with lag screws.

Any number of clamps can be accommodated in a single rack, but as they are quite heavy it is advisable to have supporting frames not over six feet apart.



DETAILS OF CLAMP RACK.

The notches are three-eigths of an inch wide, one inch deep, and six inches apart.

The rack should be made to hold *exactly* the number of clamps belonging to the department. It has been found that by painting the insides of the notches (in which the clamps rest) *white* and the rest of the rack *black* the detection of the fact that clamps have not been returned to their places is greatly facilitated. One or two white spots upon the black framework and between the black steel clamps catch the eye instantly. The white surfaces are hidden by the clamps when the latter are in their places.

MAKING A GAS SOLDERING FURNACE

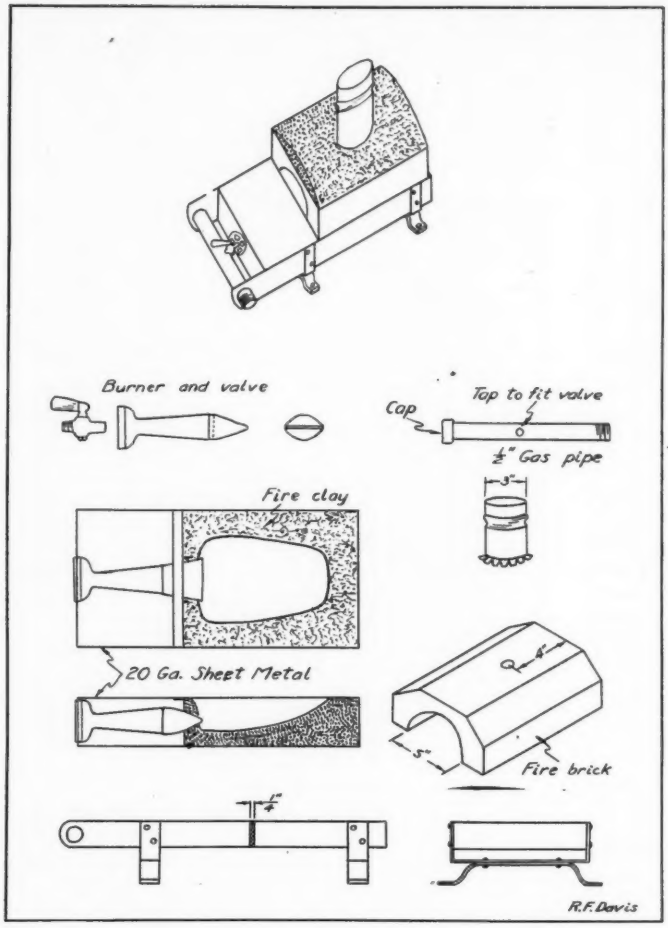
R. F. Davis, Lincoln School, Hibbing, Minn.

The problem of obtaining two gas soldering furnaces recently confronted me and as no funds could be appropriated it was apparent that they would have to be constructed at a total cost of nothing. For the benefit of other instructors who may meet similar circumstances I pass along the idea.

A junk dealer was consulted. After much dickering, he parted with two straight oven burners and the valves. A discarded locker furnished the necessary twenty-gauge steel for the body. From the boiler room two fire bricks, some fire clay, and a few pipe fittings were obtained. After hunting about the shop a handful of bolts and rivets and a couple of pieces of strap iron were found, and I was ready to begin work.

The burners were first sawed off at the end of the tapered portion and the outside was ground round. Two pieces of sheet metal were cut and made into pipes, fitted tightly over the ground ends of the burners. These pipes were then formed so that the opening in one end was flat. A piece of one-half inch pipe was drilled and tapped to fit the burner valves. This completed the burner assemblies.

The body was made up from sheet steel as shown in the drawing. The partition has an opening cut in the center supporting the end of the burner.



DETAILS OF GAS SOLDERING FURNACE.

The ends of the side members were drilled to support the gas feed pipe. The cross members support the body of the furnace and the legs are riveted to the lower side of the cross members.

The fire clay lining is so shaped that the flame will be directed upward toward the back, and at the same time provide a support for the soldering coppers.

A strip of sheet metal was bent to fit between the fire clay lining and the body steel; and a suitable opening was cut in the front side to admit the soldering coppers. Before putting the fire brick into place, a hole should be drilled as shown, providing an escape for the air in the furnace which would otherwise force the flame out of the front opening. A short length of pipe was notched around the bottom and the sections bent outward. This was centered over the opening; the fire clay was built up to hold the pipe and to give the furnace a finished appearance.

A sheet metal cover was fitted over the burner and the metal parts were given a coating of asphaltum paint.

This furnace will heat a pair of our largest coppers to a soldering heat in three minutes, and there is no delay waiting for a gasoline torch to generate.

DIE WORKER'S CLAMP

Herbert D. Harper, New York City

The die worker's clamp comes in handy for holding templets or die blocks, or for holding irregular shaped parts when scribing their outline. The reason the legs are long is to give plenty of space between them and above the work, so that nothing will interfere with the scribing.

The legs are made from one-inch square C. R. steel, milled to size and then bent as shown. The machining of the center block and screw should give no trouble.

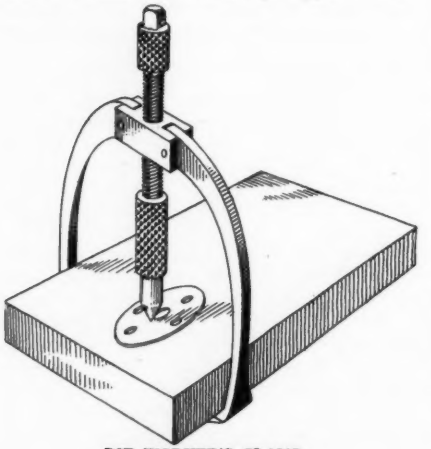
When used for holding templets on narrow work, it is necessary to provide extension points to fit the screw.

A COMBINATION AUTO TRUNK AND TABLE

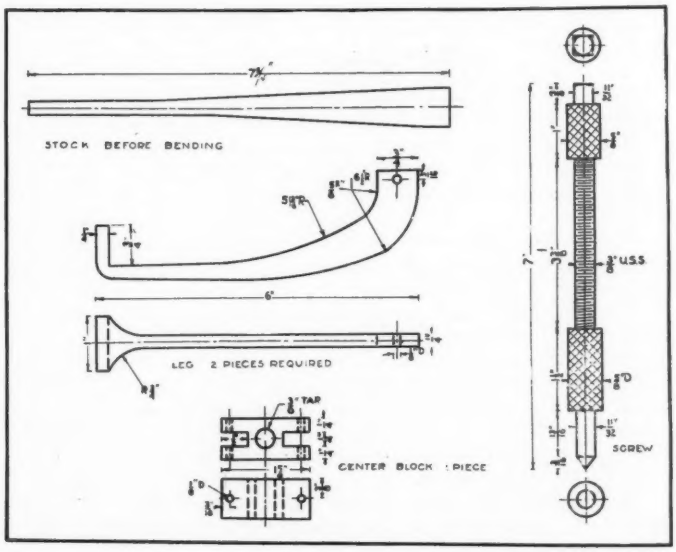
Henry L. Buehren, Cincinnati, Ohio

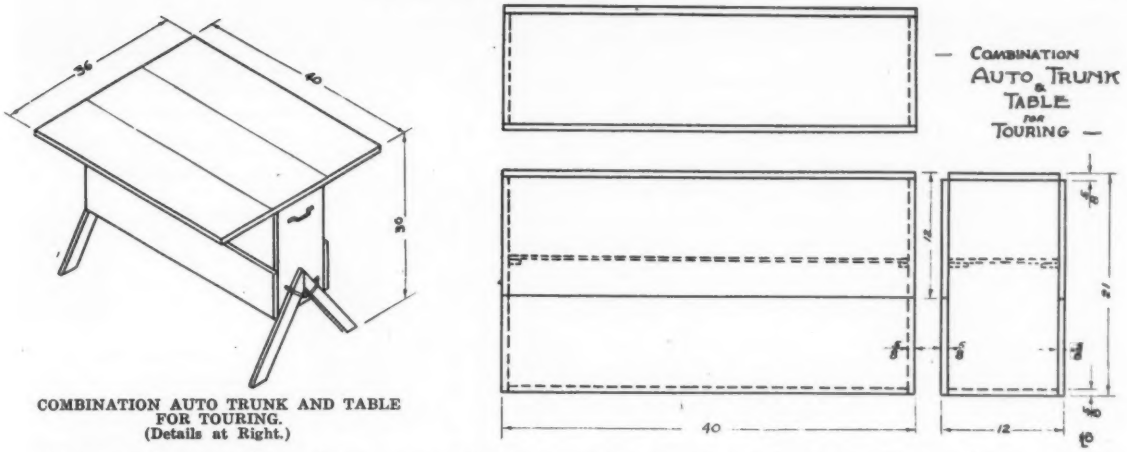
The combination auto trunk and table furnishes the need for two separate articles, which are absolutely indispensable when touring and camping. In about two minutes the trunk is unstrapped and set up ready for the next big job of the day—eats.

While dimensions are given on the drawing, for making a large and roomy trunk and table, these may be changed to suit any make or style of machine, and to accommodate any articles to be packed into it, and any number of persons whom the table must serve. A movable shelf may be placed inside, which greatly adds to convenience.



DIE WORKER'S CLAMP.
(Details in Drawing at Right.)





COMBINATION AUTO TRUNK AND TABLE FOR TOURING. (Details at Right.)

As shown, the top is fastened down, and each side is hinged to the top and allowed to swing upward, to be held in place by means of any of the various kinds of straps obtainable for such purposes.

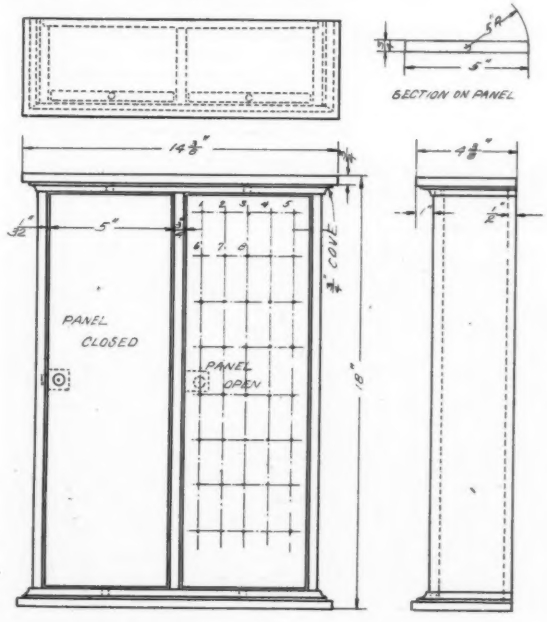
The legs are four pieces of hardwood cut to suitable length, mitered at one end, and slid under iron handles of the Knox store variety. A glance at the perspective sketch will make the arrangement clear. Pieces $\frac{5}{8}$" by $2\frac{1}{2}$" are ample for carrying a weight of 165 lbs. on the table. When the table is "knocked" down the legs are placed inside the trunk and the handles provide a handy means of holding the straps which tie the trunk to the running board or rear carrier.

KEY CABINET

Geo. H. Wichmann, Coleraine, Minn.

Good key cases and their systematic use will do much in keeping order and efficiency in school buildings and various departments. In every modern building one will find innumerable door locks, locks for table drawers, locks for filing cases, lockers, etc., but too often the keys are missing, mislaid or lost. It is, therefore, very essential that the custodian of keys have some means of filing and caring for keys.

The design shown in the drawing in addition to being simple and convenient, was selected because it allows a separate panel to be used for each class, teacher, building or other uses required of it. It may be made of any number of panels. Each panel consists of a rotating key panel ollowed to rotate in the case itself. When not in use the finished side of the panel is turned outward and locked; likewise, to open the case the key side of the panel is turned outward.

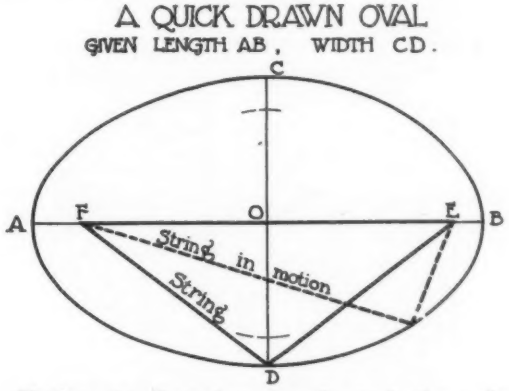


DETAILS OF KEY CABINET.

THE OVAL

Frank W. Dejmek

The following method is one of the simpliest and easiest methods of constructing an oval when the width and the length of the oval are given.



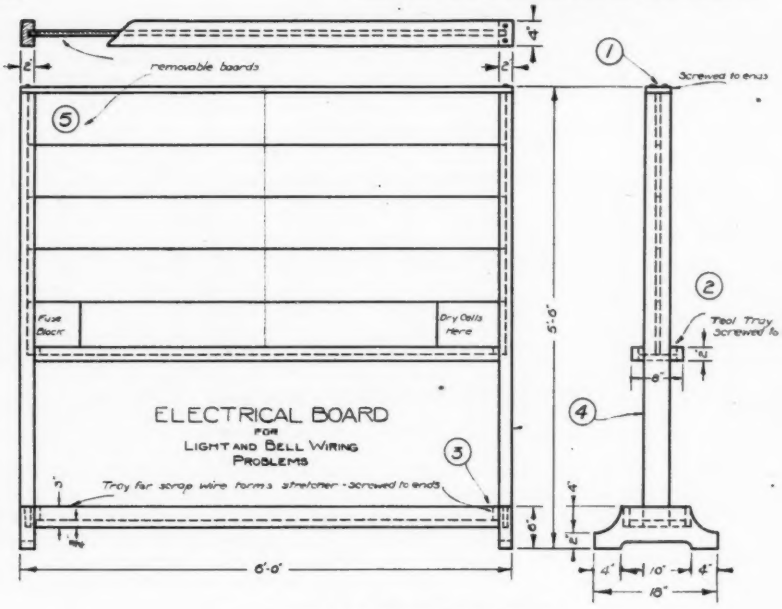
Having the dimensions for the oval given, draw line AB (the length) and CD (the width) perpendicular to line AB. Line CD must also bisect line AB. Taking one-half of the length of AB or the distance OB as a radius, set the compass or one end of the string on point D, and strike arcs on line AB as shown at points E and F. On points E, F, and D drive a small nail. Tie a string around the nails just driven as shown in the drawing, and then remove the nail at point D. It is best to use a string that does not stretch. Then place a pencil point on the inside of the string, pull tight and draw the oval through points A, D, B and C.

This is an easy and quick way of constructing ovals of any width or length. A shop man will find this method very convenient.

A KNOCK-DOWN ELECTRICAL BOARD

Emerson William Manzer, Madison, Wis.

Permanent electrical boards are out of the question in a small shop where space is almost a minus quantity. The board shown in the drawing was designed to occupy a limited space and to permit four boys to work at it at one time. Bell wiring could be carried on by the four boys or two boys could do electrical bell wiring while the other two were doing electric light wiring. A scheme of this type would call for less equipment.



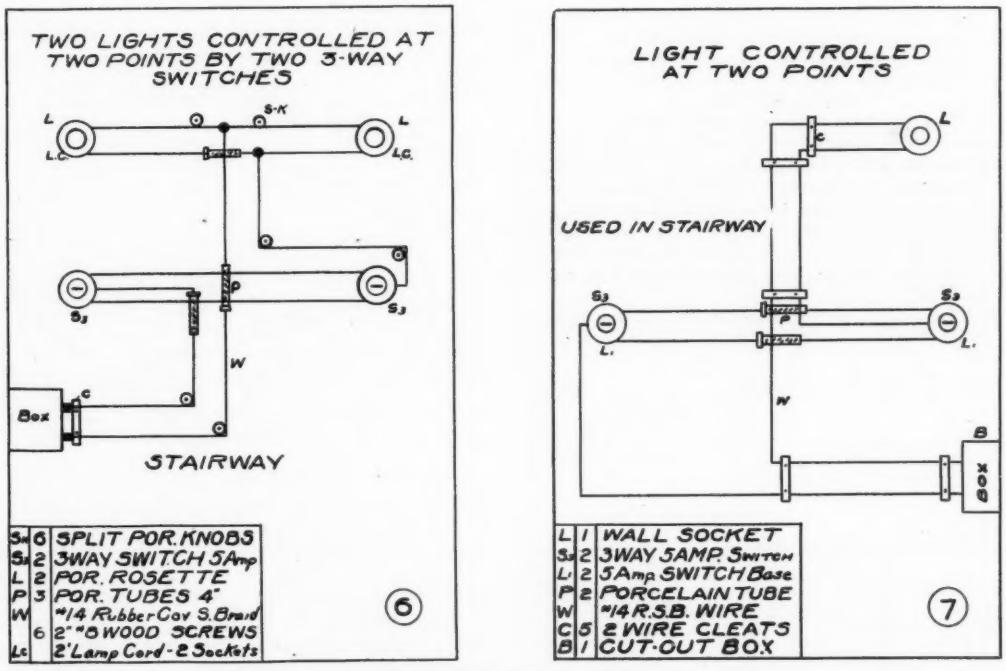
DETAILS OF ELECTRICAL BOARD.

bell magnets, or the construction of the dry cell and wet cell, can better be taken up in this department than in the manual-arts department where a duplication of equipment would be necessary. Many schools are doing this good work with success.

Two of the typical problems worked out on the boards are shown in the wiring problems of two lights, controlled at two points by two 3-way switches, and of a light controlled at two points.

Plumbing Class. A class for plumbers' apprentices has been established at the vocational school, St. Paul, Minn., with fifteen members. The subjects include related drawing, mathematics, and science.

Shop Teachers' Conference. Vocational teachers and directors of Indiana attended a conference for shop and drawing teachers held the early part of April at Purdue University, Lafayette, Ind. The conference was held under the direction of the engineering extension division of the University, with the cooperation of the industrial division of vocational education of the state educa-



PROBLEMS IN ELECTRICAL WIRING.

The drawing shows how the trays form the stretchers for the two end parts. The boards for the layout work may be changed when they are filled with too many holes made by attaching the sockets and bells. The top strip when removed permits the removal of these boards. A gray paint makes a very neat finish.

On each board a cut-out box is mounted with the usual fuse block. While the students are at work, the fuses are removed so that no "juice" is in the wire. When the exercise is completed, the student very carefully checks the path of the current before the fuses are placed in the block. If the layout is successful, a drawing of it is made in a note book for electrical work.

Correlation can be made with the science department in this work. For example, the working of the electric

tion department. The session took up the topics of teaching problems, teaching methods, and standard practices in shop and drawing subjects, and was arranged in the form of group conferences and round-table discussions.

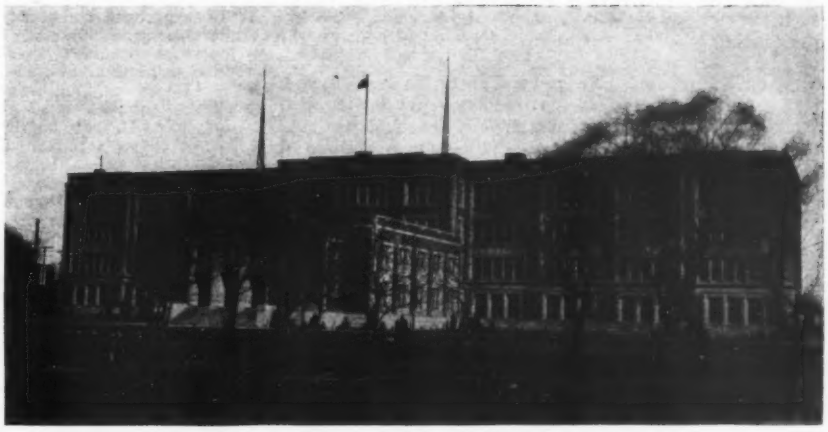
Home Mechanics Jobs. A home mechanics class was recently organized in the West High School at Akron, O., under the direction of Mr. E. H. Hummel. The class is composed of eleven boys who are trained to do all the repair work about the ordinary home. Under the plan adopted, students are assigned to do certain jobs about the school, including the placing of window panes, the replacing of blackboards, the repair of school seats, and similar odd jobs about the building. The experiment has proven so successful it will no doubt be extended to all the high schools next year.

Extend Vocational Courses. The authorities of the west side high school at Los Palos, Calif., have undertaken a revision of the entire course of study. Boys will be given instruction in wood working as applied to homes and farms, tinning, pipe connections, soldering, forging, auto repairing and ignition, mechanical drawing, shop mathematics and English. Girls will be cared for in an enlarged household arts department, room and equipment for which have been provided.

"W B B W"

A **Junior High School Project in Radio Broadcasting**
S. M. Klinefelter

A BROADCASTING station as a junior high school project is rather out of the ordinary, so much so in fact that only one has been carried to completion in a school of this class. This is station WBBW, at the Ruffner Junior High School in Norfolk, Va.



RUFFNER JUNIOR HIGH SCHOOL, NORFOLK, VA.

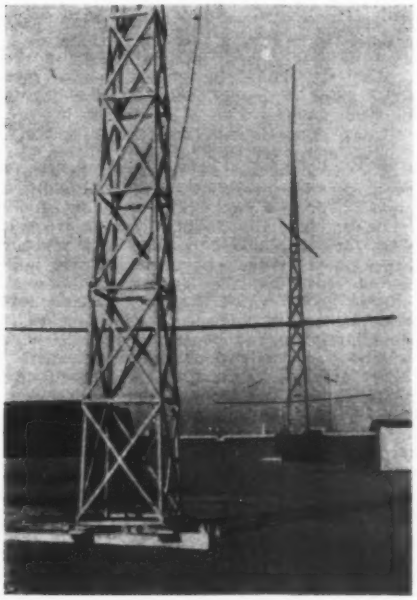
This station was conceived as an electrical shop project early in the 1923-24 session and, after much persuasion on the part of those interested, an appropriation was obtained from the school board to start the station.

PAINTING THE MAST.

It was found that instead of a one-shop project, a whole school proposition was involved. The building of the station not only required all the shops, but it was found necessary to enlist the sympathy and interest of the entire student body in order to raise money for completing the equipment.

The operating room and studio were the first real problems encountered and these were solved by partitioning off half of a laboratory storeroom on the top floor for an operating room, and screening off a corner of the auditorium stage as a studio. This makes it possible to use the auditorium piano in programs and to broadcast entertainments given in the auditorium. The auditorium is on the ground floor, so that it was necessary to run microphone and telephone lines to the operating room. This gave the boys in the shop a good opportunity to do some real conduit work.

Many other difficulties were encountered. There were government license requirements to be met, a generator hum to be subdued, an aerial to be erected, and the set itself to be built and put into operation. All this required a great deal of work, but it was all work in which the boys took a great deal of interest and which they were glad to do. The original antenna system did not prove entirely satisfactory and during the past winter a pair of 55-foot wooden masts were built and erected on top of the building, and a new aerial was strung between them.



RADIO TOWERS AT STATION WBBW, RUFFNER JUNIOR HIGH SCHOOL, NORFOLK, VA.

OPERATING ROOM STATION WBBW, RUFFNER JUNIOR HIGH SCHOOL, NORFOLK, VA.

As broadcasting stations are required to have a licensed commercial operator on hand when operating, and

such are not readily found among the student body of a junior high school, it was necessary to call in two students of the Maury senior high school who are equipped with commercial licenses. They were of much assistance in planning and building the station, as well as operating it.

At the present time "WBBW" is broadcasting quite regularly, generally on Friday night. So far as possible the programs are made up of school talent or of school interests. Recent programs include one presented by Ruffner students and faculty, one by the Ballentine Home and School League of Norfolk, one by the Norfolk night schools, a public program given to raise money to help pay for the station, and the broadcasting of the Maury high school minstrel show.

For a 50-watt station, built by amateurs, "WBBW" has gotten out quite well. One program given recently was heard and reported in fifteen states from Maine to Jacksonville, Florida, and west to Illinois, as well as in Nova Scotia, Canada. All reports received are answered by students in the Ruffner typewriting classes, who take particular pride and pleasure in the work. The station has had "certified reception stamps" printed which are sent to listeners requesting them.

VOCATIONAL EDUCATION SOCIETY OF BOSTON

Frederick Ames Coates.

"Vocational Aim in the Curriculum" was the topic upon which Professor Guy M. Wilson, of Boston University School of Education, addressed the Vocational Education Society at its monthly meeting on Saturday, March 11. The meeting was held in the dining hall of the Everett high school. This is one of the newer high schools of Massachusetts, and many of the members of the Society took advantage of the opportunity to inspect its arrangements and accommodations, particularly its well-equipped shops for the industrial subjects.

Professor Wilson advised vocational teachers to be more aggressive in urging the dignity and necessity of their work. It is neither a fad, nor a thing to apologize for; but a necessary and integral part of the public school's task. It should be given greater recognition, even to the point of being accepted as college-entrance credit for students who wish so to employ it.

Vocational education is not short-sighted, "dollar-chasing" education, averred Professor Wilson. In emphasizing utility, even immediate utility, it is doing exactly the same thing that every other part or subject of the curriculum did in the past. The schools of Sturm, in Germany, in emphasizing Latin, are doing precisely the same thing. Sturm realized that the boys who attend his schools were chiefly those who are later to enter the universities and study for the learned professions. Practically all the books which they would have occasion to study were printed in Latin; Latin, therefore, was the most immediately useful vocational acquisition of any student. The same conditions prevailed when Harvard college was founded; Latin was still the universal language of science, philosophy, theology. No one studied it because it was "cultural"; merely because it was useful.

It is characteristic, however, of the conservatism of schoolmen that subjects tend to become entrenched in school systems and to remain predominant long after their usefulness has dwindled. So true is this, that many people do not think of utility at all as the touchstone by which a curriculum must be judged.

In fact, however, the business of the school is to help the child to do better in life what he is going to do anyway. It should lay its emphasis not on looking into books, but in looking around at the present-day world and its work.

"Cold storage" information not only is of practically no value, but may be an actual detriment. It is not a question of immediate versus deferred values; the real opposition is between education which serves here and now, and the education which does not serve at all. Though modern trend is fortunately against it, the disciplinary or "grindstone" theory of education still has many defenders. They believe that the harder the subject is, the more good, in the form of mental discipline, it does the pupil. In combatting this idea, we as vocational teachers should know exactly where we stand on matters relating to the planning of a curriculum. We should get away from the thought that there is a necessary conflict between the new and the old subjects; a rivalry in which one must win and the other must lose. Rather than such strike, cooperation and understanding should bring all teachers together in an agreement on the fundamental interests of the child, on the objectives of education, and on the needs of our national and social life.

There are four principal arguments by which subjects no longer useful are not only defended, but given preference in the curriculum by their advocates. The first of these is the argument for the mere accumulation of facts as such. "Be widely informed," is the cry; quite oblivious of the nature of the information, and of the demonstrated fact that we forget any information which we cannot use.

The traditional principle is the second. Conservatism, the momentum of subjects which have been taught for decades or centuries, constitutes to some an argument for keeping them in the curriculum.

A third argument is that of mental discipline. This is the last retreat of a dying subject. Experimental psychology has disproved the peculiar thesis that the more useless and abstract subjects give any more or any better mental discipline than do the more utilitarian studies. Professor Thorndyke of Columbia has proved that the difference in mental growth imparted by an equal amount of time and effort spent on the most diverse subjects, is quite immaterial.

Culture is the fourth slogan of the ultra-conservative. Everyone wants culture; but there is no agreement on what it is. Too often it has meant studying the subjects which are studied by a favored or envied class. People of leisure study Latin and Greek; therefore we should all study them, to extract from them the mysterious "culture" which they contain, is the theory. Defining culture as "the ability to think as you work, and to think through to conclusions", Professor Wilson exposed the fallacy of the assumption that it is germane to certain selected subjects, and absent from all others.

Vocational aim in education needs no defenders, concluded the speaker; though it has them in plenty. It stands at least on a parity with any other aim which education may have. It has, in addition, a special mission of its own which we should be quick to grasp. It can and should implant in young people a better attitude towards work, and an understanding of industrial and economic problems.

Prior to the introduction of the speaker, a brief business meeting was held. The membership voted to leave the choice of the next meeting place to the executive committee, without instructions. The Thompson's Island trip was definitely abandoned for a number of reasons, among them being the risk of inclement weather on a day selected for an outing.

The next meeting, the final of the year, will include in its order of business the election of new members, and the choice of officers for next year. A nominating committee was chosen from the floor to prepare a slate. This committee consists of John C. Brodhead, M. Norcross Stratton and Henry A. Bonin.

CONFERENCE OF CONTINUATION SCHOOL TEACHERS

A conference of continuation school teachers and directors of the state of Michigan was held April 2nd at the School of Education of the University of Michigan. About fifty representatives were in attendance. Prof. Cleo Murtland, of the Vocational Education Department, conducted the conference, and Dean Whitney of the School of Education, welcomed the members.

The topics discussed were: 1. Why is part-time education worth while? 2. Lesson sheets and how to use them.

Director Nellie Clark gave the results of a vote on the question, "Is the part-time school worth while?" Of 289 girls in her classes, 236 said "Yes". Director Tomlinson, of Port Huron, questioned the advisability of the long summer vacation.

The discussion on the second topic centered largely on the lesson sheet material furnished by the instructors present. Mr. Goold of Saginaw, Mr. Hodgson of Ann Arbor, Mr. Davey of Detroit, and Mr. Lightfoot of Flint, brought samples of lesson sheets prepared for their classes and explained their use.

MEETING OF MICHIGAN SOCIETY FOR VOCATIONAL EDUCATION

The Michigan Society for Vocational Education held a most successful meeting on Friday, April 3rd, at Ann Arbor, Mich. In the absence of the president, Dr. G. E. Meyers, the secretary presided. An excellent luncheon was served.

The most significant feature of the meeting was the spirit of cooperation manifested by teachers in all lines.

Agricultural teachers cooperated with industrial teachers in making farm work a success in the rural communities. The home economics teachers studied the problem of the farm girl, and the industrial and part-time teachers worked together for the benefit of the city boy and girl.

The first speaker was Miss Ruth Ann Hood, of Grand Rapids, who handled the topic, "What is the Most Perplexing Question in Home Economics in Michigan?" Miss Hood pointed out that many of the girls finish only the ninth or tenth grade before leaving to assume duties, and it is a problem of selecting those things which will carry over into the later home life. Considerable attention is given to food selection, marketing, and meal planning.

The second problem is that of the relation of the teacher to home life. Civics teaches the need for thrift but home economics teaches budgeting. Civics teaches the need of health rules, while home economics teaches these rules through demonstration.

The next speaker was B. A. Walpole, of the Michigan Agricultural College, who spoke on the subject, "The Most Perplexing Question in Vocational Agricultural Education." Mr. Walpole pointed to the fact that ten years ago vocational agriculture was almost unknown in Michigan, whereas today it is taught, to some extent, in nearly every high school in the state. He emphasized that the present problem is how to carry out the work successfully against existing obstacles and opposition. The development of the subject matter is of some importance, and there is need for training vocational agricultural teachers to understand their students and to follow them up outside of school. It is necessary that teachers in this field go through at least the normal school; it is also the duty of the college to follow up the young teacher in his school.

The next paper was presented for Dr. J. L. Holtsclaw, of Detroit, who spoke on the subject, "What is the Most Perplexing Question in Commercial Education in Michigan?" In this paper it was brought out that the problem of commercial education appears to be that of obtaining properly trained teachers. In Detroit, it is possible to obtain teachers from nearly every state, largely because of the salaries paid. The problem of obtaining teachers is greater in the small cities, but it should not be necessary to go outside of the state to obtain such teachers.

Prof. E. L. Hayes, principal of the continuation schools of Detroit, was next on the program, taking for his subject, "The Most Perplexing Question in Industrial Education in Michigan." Mr. Hayes talked about home makers and home disturbers and about the problem of the 16-year-old boy or girl who is a misfit in the present system of education. He discussed the pupil with the low I.Q. who reaches the saturation point early and eventually reaches the part-time or vocational school, and also the embryo drifter who might become a potential bandit if left to his own devices. These should be turned into right directions; they must have something that appeals to their special bent or they will not come to a good end. In Detroit, the counsellors select these special cases and place them in adjustment classes. It is found that many children are misplaced and are able to succeed if properly placed and directed. In the special shop cases are grouped pupils of the unemployable type. They are not taught specific trades but are taught how to work on a productive basis, with the addition of some work in civics and community living.

Another problem has been the establishment of a definite aim for part-time students, since many have the idea that they must mark time until they reach the age of 17. It is necessary that definite aims be set up for these students; it will be necessary to set up a definite program that they will recognize, that the school will recognize, and that the community will recognize as worth while. In Detroit, a system of accomplishment certificates is used to show what the pupil is capable of doing. These certificates list the operations they have learned to do successfully and they stimulate the students to greater effort.

Following the general meeting, the session broke up into conferences in the different lines of vocational education. This has been found a most effective way of conducting conferences on the special subjects.

The nominating committee reported on the selection of officers as follows: President, Prof. B. A. Walpole; Secretary, K. G. Smith, Lansing.

A Message

From Hon. J. J. Davis, Secretary of Labor and Chairman, of Federal Board for Vocational Education

To the 150 Apprentices receiving their diplomas at the First Annual Commencement of the Cleveland Building Trades Apprentice Schools, to the 1,000 Apprentices now attending this school, to the various employers and labor organizations whose cooperation has made this school a success, my greetings and message on Apprenticeship are directed:

April 10, 1925.

Under the old guild system apprenticeship for the skilled crafts was remarkably successful. That period of history is often referred to as the "Golden Age of Apprenticeship." Under that old plan the several crafts accepted a large part of the responsibility for adequate and thorough training of new recruits. The apprentice was indentured or bound out to a master who was held responsible not only for teaching him the technique of the craft, but also for teaching him those other things which were deemed essential for a citizen of that period. The apprentice usually lived in the home of the master as a member of his family.

In those days the skilled crafts occupied a place of honor in the general scheme of things and to become an apprentice to a master workman was regarded as a high privilege. Under those conditions apprentices enjoyed an opportunity for acquiring thorough mastery of their crafts. Working as they did under the eyes of master craftsmen they always had before them high standards of workmanship and fine examples of the best products of skilled experts.

With the introduction of the factory system and specialized and quantity production by machines this old apprenticeship system practically disappeared. For some time, however, a form of apprenticeship existed in theory, but twenty or thirty years ago apprenticeship in the old sense had practically ceased to exist in the United States as an institution. During this period we depended almost entirely upon European countries for the training of our skilled mechanics. Within the last few years as this source of supply has dwindled, and for other reasons, considerable interest has been aroused in the revival of an adequate and efficient new scheme of apprenticeship training for the skilled trades. One fundamental cause of this interest is the recognition of the fact that the work which society needs, and must have, will be done in one way if it cannot be done in another. If skilled workmen are not to be had, different methods of construction and substitute materials will be used. This means that with a continued shortage of skilled craftsmen the skilled trades will be supplanted in whole or in part by new and perhaps less highly skilled trades utilizing different materials and different technique. This situation affects at least three classes of people:

1. It affects the manufacturer of building materials because it reduces the demand and spoils the market for his product. As an example of this an adequate shortage of expert tile setters causes architects to omit tile work from their specifications when they would otherwise include it. Obviously, this affects the demand for tile and reflects back upon the manufacturer of tile, with the result that he soon becomes interested in any good plan which is directed toward the training of expert tile setters. A shortage of competent plumbers correspondingly affects the manufacturers of plumbing supplies.

Many other similar illustrations might be given, such as the substitution of wall board for plaster, which will grow in proportion as it becomes more difficult to secure qualified plasterers.

2. It affects the contractor because a shortage of competent workmen makes it difficult for him to bid on construction work with any degee of certainty as to the cost of finishing the contract. In proportion as the employer has to struggle along with half trained mechanics, not only is the cost of the work increased, but the element of uncertainty as to what the cost will be is increased many fold. The employer, therefore, should be interested in any good plan of apprenticeship which promises a supply of competent men for the skilled trades.

3. The interests of the workers in the various trades are profoundly affected by inefficient and poorly trained workmen in their crafts. In proportion as the supply of

highly skilled men decreases, the entire status of the craft suffers. In this connection I wish to state emphatically that all intelligent labor leaders have always been in favor of maintaining the standards of their crafts and have always encouraged and supported plans for the thorough training of apprentices.

In addition to the three groups mentioned, those interests are affected by these conditions, the fact should not be lost sight of that the general public is and should be concerned with this problem because it eventually has to pay the bill. If time permitted it would be very easy to show that this matter of having an adequate supply of skilled craftsmen affects the interests of the architect, the owner, and the investor in real estate. In fact, it would be difficult to point to any individual or group of individuals whose interests are not affected by a shortage of thoroughly trained mechanics.

It is now quite generally recognized that, if the standards of the skilled trades are to be preserved, a real system of training apprentices must be set up. Obviously the details of such plans will be affected by local considerations but there are certain fundamental points that must characterize any plan for apprenticeship training if it is to be successful. Some of these fundamental points are:

1. The right kind of a boy must be secured. Boys who have those qualities and the degree of intelligence which are necessary for skilled workers in the building trades cannot be secured unless suitable incentives are offered to attract them.

2. There must be a guarantee of thorough training not only in trade processes but in the technical aspects of the trade.

3. The working conditions must be comparable with those which prevail in other lines of work which boys may enter.

4. There should be some sort of a representative board or committee with supervisory responsibilities to insure that the apprentice gets a square deal, thorough training, and adequate instruction.

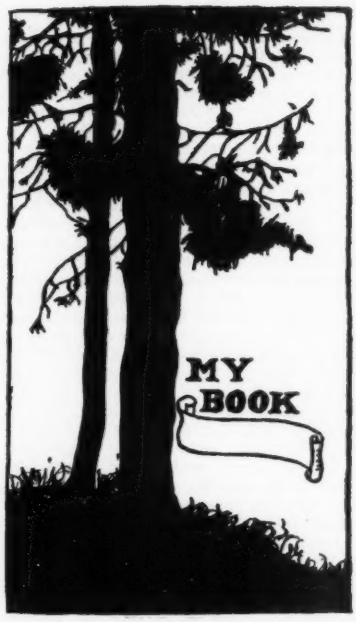
If the apprenticeship system was at work as it has been in past generations we would find some seven or eight millions of our youth learning the trades. But the vast majority leaving school find themselves thrown out into the world without adequate training for earning a livelihood. They are forced to "pick up" an occupation wherever they may find it. Some succeed, but far too many fail through no fault of their own and are doomed to a lifetime of drudgery at an occupation for which they are in no way fitted. Industry and the community as well as the individual pay the penalty for these untrained workers. For the untrained worker is the migratory worker, the square peg which is always seeking in vain for the round hole in which to fit himself. He is the vital factor in that incubus of industry, labor turnover. It has been estimated that the industries of the United States lose annually $200,000,000 by reason of labor turnover, and that the average cost to the employer of hiring men to fill the places of those who quit their employment is $50.

We cannot hope for a revival of the old apprentice system. It was designed to fit the age of hand production, when the master workman and the learner worked side by side. It does not fit into the scheme of modern production. Our hope lies in education, in the training of the hand of youth as well as its head. We have begun the task of enlisting the public school system, with its vast resources, and its long experience, to cooperate with industry in training up a nation of workers. We are seeking the balanced education, for we have learned that the carpenter who as he saws the board can visualize the completed building is a better workman, a better citizen than the carpenter whose vision ends at the point of his tools. Through the operation of the Federal Board for Vocational Education, under Federal and State vocational acts, we have, during the past seven years, built up a system which we believe points the way to the solution of this problem. Today it is reaching more than 650,000 potential or actual workers.

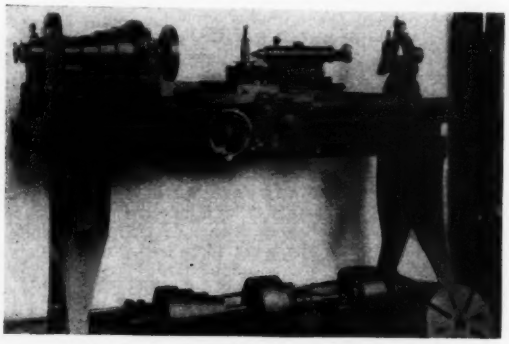
Thus we are restoring the dignity of labor. We are overcoming that tendency to look upon work with the hands as menial and degrading which is one of the pressing perils of American life. We are providing for the future of American self-supporting citizens, each a credit to himself and to the community. We are building Americans of tomorrow strong in the realization of the words of the poet:

"No man can feel himself alone,
The while he bravely stands;
Between the best friends ever known
His two good honest hands."

Work is happiness. There is no joy that stirs the human heart that is so complete as the sense of work well done, of a task accomplished. Through all the ages men have found supreme content in doing the work that lay before them.



BOOK PLATE MADE BY STUDENT IN THE KENWOOD JUNIOR HIGH SCHOOL, CLEVELAND, OHIO.



12" ENGINE LATHE MADE AT THE ROCHESTER SHOP SCHOOL, ROCHESTER, N. Y.—HOWARD S. BENNETT, PRINCIPAL.

Gift of $100,000 for School. William N. Pelouze has offered to contribute $100,000 to the proposed industrial art school to be erected near the Chicago Art Institute. The offer is conditioned upon the raising of the remaining $200,000 by the end of the year.

Boys Follow School Trades. A. B. Anderson, state supervisor of trades and industries for the state department of instruction of Delaware, in a recent report, shows that 21 of the 26 boys graduated from the cooperative course in the Wilmington high school during the past three and one-half years have followed the trades studied in school This excellent showing is attributed to the policy of half-time shop training while in school, permitting the boys to enter the trade upon completion of the two-year course; it is due also to the further fact that the trade instructors in the school are experienced tradesmen and know the kind of instruction necessary to produce skilled mechanics. Many students after receiving their high school diplomas, remain two years longer and receive vocational certificates.

Vocational Conference for High School Students. The second annual conference of vocational guidance for high school boys of Idaho was held April 22nd, 23rd and 24th, at Pocatello. The conference is for the purpose of assisting high school boys of the state in reaching the right decision in the problems of further educational training and of a life career best suited to the nature and inclination of each. The delegates to the conference are chosen from the upper classes of the high schools and in proportion to the total enrollment of the school.

Industrial Arts Vocabulary

F. S. Crispin, Philadelphia, Pa.

Abacus (arch). The upper part of the capital of a column; either square or curved.

Abrasion. The process of reducing material by grinding instead of cutting with tools.

Abscissa. The length of an axis at right angles to the axis of ordinates.

Abutment. The support of an arch, beam or bridge, which sustains the reactions due to the load.

Accurate. Without error; precise; correct, conforming exactly to a standard.

Acceleration. The rate at which the velocity of a moving body increases.

Accumulator. A cylinder into which water is forced in order to furnish the motive power in hydraulic machines of various kinds. (Electrical.) A storage battery.

Acetylene Gas. An illuminating gas resulting from the action of water on calcium carbide.

Accoustics. The science of sound; the study of the effects of sound upon the ear.

Acme Thread. A screw thread, the section of which is between the square and V thread. Used extensively for feed screws. The included angle of space is 29° as compared to 60° of the U. S. thread.

Acute Angle. One which is less than a right angle.

Addendum. The point of face of the tooth of a gear-wheel, lying outside the pitch circle.

Adhesion or adhesive power. The friction existing between a driving wheel and the surface with which it is in contact.

Adjusting Screw. A set screw by the use of which the position of machine parts is adjusted or regulated more accurately than would be possible by the mere setting to dimensions.

Adjustment. The placing and setting of engine and machine parts in related position.

Adjustment Strips. Wedge shaped strips of metal by means of which the exact bearing of sliding surfaces is accurately adjusted, correct contact being obtained by the use of set or adjustment screws.

Adze. A cutting tool with the blade set at right angles to the handle; used for rough dressing timber.

Aeration. The passing of air through water or other liquid to effect purification; exposure to the chemical action of air.

Air Hardening. The hardening of high speed steels by air blast.

Aggregate. A mass formed by the union of similar particles.

Alcove (arch). A recess in a wall or room.

Alignment. Linear accuracy, uniformity, or coincidence of the centers of a lathe. Also applied to the axial continuity of shafting and shaft bearings; a straight line of adjustment through two or more points.

Alloy. A homogeneous combination of two or more metals, usually a fine and a baser metal.

Alternating Current. An electric current which reverses in direction at rapid, regular intervals, usually 120 times per second.

Aluminum Alloys. The value of these is greater than that of the pure metal. Many have trade names. They are used for castings and sheets where a combination of great strength with lightness is required.

Aluminum Bronze. An alloy of copper with aluminum, in various and widely different proportions.

Ammeter. The instrument used for measuring the strength of the current in an electric circuit.

Ampere. The unit of measurement of electric current strength. A pressure of one volt will force one ampere through a resistance of one ohm.

Amplitude. An angle upon which the value of some mathematical function depends; the distance covered by a particle in making a complete vibration.

Analytical Geometry. The study of geometric figures by the processes of algebraic analysis.

Anemometer. An instrument for measuring the velocity of an air current.

Aneroid Barometer. An instrument for showing the pressure of the atmosphere by means of the movements of the elastic top or diaphragm of an exhausted metallic box.

Angle. An angle is formed by the inclination of two straight lines toward one another.

Angle Bracket. A form of support having two faces, generally at right angles to each other. A web is often added to increase strength.

Angle Bracket. A form of support having two faces, generally at right angles to each other. A web is often added to increase strength.

Angle Plate. Used in setting up work, generally for machinery; made of cast iron, being formed of two plates of metal at right angles with each other, and pierced with holes or slots for the reception of bolts.

Angle of Repose or angle of friction. The angle of a plane surface inclined relatively to the horizon upon which a body will, under specific conditions, just begin to slide. It varies with the nature of the particular materials placed in contact.

Annealing. The gradual heating and gradual cooling of glass, metals, or other materials to reduce brittleness and increase flexibility, etc.

Annual Ring. The circumferential layers of wood seen in a cross section of timber, which represent the yearly growth.

Annular Wheel. A ring gear with teeth fixed to its internal circumference; called also an internal gear. An annular wheel should always revolve in the same direction as that of its pinion.

Anti-Friction Metal. Babbitt's metal, or white metal, used for lining the steps and bearings of shafts and axles, and similar moving parts; inexpensive and efficient.

Anvil. The steel or iron block upon which forging is done.

Anvil Block. A massive block of cast iron which is placed beneath the anvils of steam and other heavy hammers, for the absorption of the vibration due to the blow. It is often embedded in masonry or on concrete.

Apex. The top or peak of a cone, pyramid, or conical figure generally.

Application. The act of applying; putting into practice; the practical demonstration of a principle.

Approximately. Nearly; a word frequently used when speaking of the capabilities of machines and their measurements, also their near shipping weights.

Apron. The vertical plate in the front part of the slide rest of a screw cutting lathe to which the split nut is attached.

Aqueduct. A water conduit of channels, steel pipes, siphons, or tunnels, etc., through which a community is supplied.

Arbor. A small shaft or spindle.

Arc. The arc of a circle is any portion of its circumference.

Arcade (arch). An arched passageway.

Arc of Contact. In tooth gearing, is the space included between those two points where the contact of a single pair of wheel teeth begins and ends.

Arch (arch). A curved structure designed to resist external pressure.

Arch Bar. A flat bar or strip of iron used as a support for a flat arch.

Archimedes' Principle. A body wholly or partly immersed in a fluid is buoyed up by a force equal to the weight of the fluid displaced.

Architrave (arch). That portion of an entablature which rests upon the column heads and supports the frieze.

Armature. The revolving member of a dynamo.

Armature Core. A core of metal surrounded by a coil of wire or the like, rotating near the poles of a magnet.

Asbestos. A mineral compound composed chiefly of silica and magnesia, existing as varieties of hornblende, augite, and serpentine. The commercial asbestos comes from Italy and Canada. It is a silky fibrous substance, owing its value as a heat resisting body to the presence of silica.

Asbestos Shingles. A fireproof roof covering made in the form of shingles; asbestos is the principal part of its composition.

Ash. A light colored, coarse grained wood used frequently for the spokes and felloes of wheels, for hammer handles, and generally in work requiring great flexibility combined with moderate strength.

Ashlar (arch). When the outside facing of a wall is of cut stone it is called ashlar regardless of the method of finishing.

Asphalt. Mineral pitch; a bituminous composition used for paving, flooring, roofing, etc.

Assembling. The putting together in correct relation of the parts which comprise a piece of mechanism.

Assume. Take for granted.

Astragal (arch). A rounded molding used to cover the joint between doors.

Atomic Weight. The weight of the atom of any element as compared with another as a standard, usually hydrogen taken as 1.

Atoms. The ultimate indivisible particles of matter.

Auger. A wood-boring tool of large size for making bolt or other holes. Augers are either "shell" or "twisted", the former are stronger, the latter bore more accurately.

Automatic, self-regulating or adjusting. A movement is automatic when it is effected without the direct intervention of the hand.

Axis. A central line considered in relation to certain geometrical or mechanical relations. A point or line about which or on which a part revolves.

Axis of Symmetry. An imaginary central line around which a symmetrically developed body is formed, and in which the center of gravity is found.

Auxiliary. Giving or furnishing aid or support, generally in a subordinate or secondary manner; supplementary; as an auxiliary view in drawing.

Awl. A small pointed tool for making holes for nails or screws.

Axle. A shaft or device which carries the driving, traveling, or truck wheels of a vehicle such as a locomotive, wagon, trolley, automobile, etc.

Azimuth of a Line. Is the angle which the vertical plane containing it makes with the plane of the meridian.

(To be continued)

Conference of Michigan Continuation Teachers and Directors. The annual conference of general continuation teachers and directors of Michigan took place April 2nd, at Tappan Hall, Ann Arbor, Mich. Prof. Cleo Murtland acted as chairman of the conference.

Dr. Whitney, who gave the welcoming address, outlined the accomplishments of education and gave a brief prophecy for the future of part-time education.

Mr. C. A. Wardner, speaking on part-time education, declared it is worth while because it makes the students desire more education, gains promotion on the job, and calls for more attention to health rules. Ethel Wooden pointed out that attacks on part-time education are a reflection on the pupils and on the community. A. B. Lightfoot held that many part-time pupils get more out of their school work than they did in the former all-day school. Nellie Clark declared students are a selected group who have answered the question of education suited to themselves. M. J. Tomlinson pointed to the fact that part-time teachers are pioneering in a new field of education and that they can point to but few accomplishments at the present time.

NOW, ARE THERE ANY QUESTIONS?

Toy Finishing

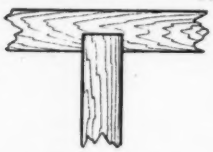
Q. 506. I would appreciate very much if you would supply me with any information and material on the dipping method of coloring toys, as to devices used and the preparation of the paints.—O. J. A.

A. There is little hard-and-fast information which can be given in regard to the materials for dipping toys. Each manufacturer employs a different grinding liquid which must be diluted with a given thinner, and the resulting batch must be tested with a specific gravity instrument for a definite gravity. The toys must be immersed and withdrawn mechanically at about three inches per minute in order to secure free flowing and freedom from sags and drips. Hand dipping is seldom successful, except as a result of long experience by the operator. It is, therefore, recommended that you use brushing methods which give much more teaching material, if the inquiry refers to manual training shop practice. You will find that full chisel, fitch flowing varnish brushes will give the best results. Be sure to suspend the brushes in pure turps between jobs, or the soft bristles will be ruined if stood upon or left to harden.—Ralph G. Waring.

Housed Joint

Q. 513. Will you please explain a "housed joint", either by diagram or otherwise? There is discussion among our faculty as to what constitutes a housed joint. —F. D. B.

A. The term "housed joint" is applied more frequently to carpentry than it is to cabinet work. It consists of letting bodily into one piece the end of another piece, which must be connected to it. The sketch below is an elevation of a typical housed joint.



DETAILS OF "HOUSED-JOINT."

Housed joints are used very frequently in making tanks and waterproof boxes. British cabinet makers sometimes spoke of a "dado joint" as a housed joint.

Burnished Bronzing

Q. 507. I am refinishing a couple of old clocks. One of the clocks has gilded columns on each side, and I have gilded them with a preparation like Sapolin, but the effect is frosted rather than metallic. How can I get the smooth polished look that the new ones have? I have tried covering with a clear varnish, but this does not materially change the appearance.—E. E.

I have tried covering with a clear varnish, but this does not materially change the appearance.—E. E.

A: Gerstendorfer Bros., 229 East 42nd Street, New York, N. Y., are the manufacturers of Sapolin enamel. If you will write to them, they will furnish you with a special bronze and liquid which can be burnished. It is the lack of this burnishing which is the cause of your trouble. Another method used in the finest shops calls for the use of gold leaf laid on an isinglass or parchment size. When dry and hard, the leaf is rubbed or burnished with an agate or bone rod until the desired effect is obtained. The materials can be bought at any large sign shop which does gold leaf sign work.—Ralph G. Waring.

Art Sheet Metal Problems

Q. 527. I am attempting to revise a course in art sheet metal for expensive metals. 1. Where do you obtain your metals? 2. What do you use for brazing torches? 3. Do you use gas from the city plant? 4. What are some of the tools used besides the ones used in the regular tin smithing? 5. Where can I obtain a text that would give me some details of the working of metals?—D. L. C.

A. 1. We obtain copper and brass from the Rome Brass & Copper Co., of Chicago, in sheets, 30″x60″, the weights of which range from fifteen to thirty pounds each. Nickel-silver is obtained from the W. T. Hungerford Brass & Copper Co., of New York, in narrow sheets, 6″ to 10″ wide and ranging in thickness from 26 to 18 gauge.

The bottoms of problems like the salt shakers are made from 18 gauge and the tops and sides from 24 to 26 gauge. Flower vases are usually made from 22 gauge.

For brazing articles, we use several materials, such as silver solder or sterling silver. For salt shakers, we use only the brazing materials just mentioned. For articles made of heavier material, I make a brazing alloy by melting 75 per cent high brass with 25 per cent nickel silver. After molten, this is poured out on an iron block, and when cool, it is filed with a coarse file into small grains. A better way of granulating this alloy is by boring holes into it and using the grains produced in this way.

For brazing nickel silver with any brazing alloy, the flux used is borax, the same as when brazing copper with spelter.

2 & 3. For brazing torches, I use city gas with which I mix compressed air, but for school shops just starting in with this work, or before instructors and pupils become more familiar with this work, I would advise the use of a plumber's blow torch. I have used a torch for many years with satisfactory results. A plumber's blow torch is not large enough for brazing on large articles where considerable heat is needed, but it can be used for articles such as salt shakers, coffee cups, egg cups, sherbet cups, small lamps and candle sticks.

As we advance at our shop so that it is necessary to make larger articles, the purchase of an air compressor for use in connection with common city gas is inavoidable.

4. We can almost start working art metal with equipment on hand or regular tin smithing, although this would not be a very easy matter. However, if we wish to make a larger variety of art metal articles, we must add the necessary equipment from time to time. Most of the smaller tools cannot be easily secured in the stores; therefore, it is up to the instructor or his pupils to make such special tools as may be required for any special problem.

A few articles which may be made with the regular tin smithing equipment are: copper envelope opened, copper tray, crumb scraper and tray, picture frames.

A number of similar articles can be hammered and made on the flat part of the tin smith's hollow mandrel. Further the conical part of the salt shaker is shaped and hammered on the blow horn stake. Parts for lamps and flower vases are made on the same tool, but special tools must be used to shape out the bases.

Some of the tools used in making salt shakers will be found in figures 2-3-5 on page 244 of the June, 1924, number of the INDUSTRIAL ARTS MAGAZINE. Other tools are made in the same manner, which will best suit the articles we are making. It usually happens when I am making a newly designed article, that I must make one or two special tools to fit the new article. These tools are made mostly by grinding steel into the required shape, but very often they have to be forged.

5. The text I would recommend to give you some inside details on the working of metals is the "Educational Metalcraft" by P. Wylie Davidson, (Longmans, Green & Co., New York City.)—H. M. Dexter.

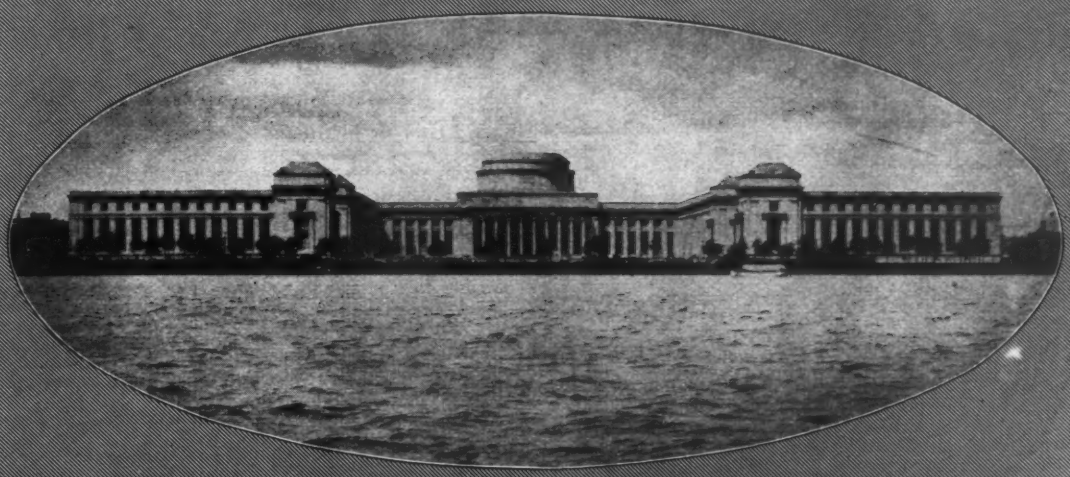
Finishing Redwood

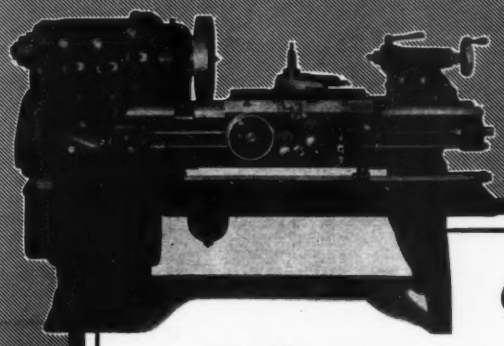
Q. 503. I would appreciate any information you might be able to give me in regard to the most desirable finish for redwood. A few members of my class have decided to use redwood, but I am not satisfied with any finish that we have given it, and consequently I am not very well satisfied with the use of redwood in the shop.—L. M. W.

A: Due to the inherent softness of redwood, it is necessary that it be given considerable protection by a heavy finish. This undoubtedly calls for fillers, or shellac and varnish.

I should severely criticise its use in a manual training shop other than a substitute material for cedar in the manufacture of chests. It is certain that with such a low cross section strength, an unusual softness, it is not suited to small pieces as taberetts, chairs, and stands, since the tenons and similar joints would lack the necessary strength to stand usage of any severity.

Perhaps the best finish would be the use of a mahogany water stain, followed by a coat of dilute orange shellac, dry five hours, sand with a split 6-0 paper, dust off, reshellac, dry and sand. One or more coats of cabinet or floor varnish may be given, depending upon the use to which it has been put. The first coat should be sanded with a split 6-0 paper and the last may be water sanded with water as desired. If the finishing is done entirely in shellac, it should be brought up with a number of coats to a good body and then rubbed to a finish with FF pumice stone, felt pad, and crude petroleum oil.—Ralph G. Waring.





and now—

The Massachusetts Institute of Technology uses The

MONARCH Helical Geared Ball Bearing LATHE

as a part of their Metal Working Equipment.

The prestige of this Institute—the corner-stone of Massachusetts' enviable system of vocational education — attracts students from the four corners of the civilized world.

In choosing the equipment for these students, the directors of the Institute must base their choice upon equipment that will give students the greatest possible amount of experience.

We are proud of the selection of the MONARCH Engine Lathe as a part of the Institution's metal working equipment — proud that it has been selected solely upon its merit, after careful consideration, as the type of equipment necessary for the high degree of training which Massachusetts "Tech" gives to its students—a training which has been so creditably reflected on the Institution by its graduates.

We shall be glad to plan your vocational metal working shop. Give us a statement of your requirements and let our Free Engineering Advisory Service plan your shop, giving you an accurate estimate of the entire equipment cost. This service is gladly rendered without charge.

THE MONARCH MACHINE TOOL COMPANY, 404 OAK STREET, SIDNEY, OHIO.

"The most intensely practical textbook on twist drills and drilling that I have ever read," **writes one enthusiastic vocational school director.**

Points on Grinding Drills

Chapter II of the "Handbook for Drillers" deals with the tremendously important job of grinding a proper point on the business end of a twist drill.

Pointing a drill sounds easy, whereas, in reality, it is a delicate piece of work requiring the utmost knowledge and skill. Students of machine shop practice find this chapter invaluable to them in their work.

More than a quarter of a million copies of this booklet have been used as textbooks by vocational and technical schools and colleges, located all the way from Alaska to India.

Copies of the "Handbook for Drillers" will be sent in any reasonable quantities to supervisors and instructors of industrial and vocational education for use as text-books by students in machine shop practice. (No charge is made for these booklets.)

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK·CHICAGO·LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

NEW BOOKS

Direct Current Machinery

By David P. Moreton, W. H. Freedman, Morton Arendt, and C. C. Adams. Cloth, 360 pages. The American Technical Society, Chicago.

The authors have been in educational and practical work for some years, and in this book non-essentials are eliminated. The book is well written and contains much general information on types of generators and motors. The most valuable part of the book for the practical man will be found in the chapters on "Armature Winding", "Motor Repair", and "Management of Dynamos"—"Electric Machinery".

The authors have endeavored in the chapter on Principles of D. C. Dynamos to present in non-technical manner some of the difficult points to understand in the generation of electric pressure. They succeeded very well in clearing up some hard questions, but failed in their effort to be non-technical.

The chapters on "Armature Winding", "Motor Repair", and "Management of Dynamo"—"Electric Machinery" will be found reprinted in other books by the authors.

Choosing Your Life Work

By William Rosengarten. Cloth, 323 pages. Price, $2. McGraw-Hill Book Co., New York.

This book is a reissue of a work published two years ago and now carefully revised and enlarged. The several occupations—professions, trades, and skilled callings—are taken up in logical groups, and the requirements, opportunities, and compensations are analyzed and rather attractively presented.

It may be questioned whether a book of this type should be as complete as is this work. Successful cartoonists, opera singers, novelists, and scenario writers are exceedingly few and far between and the formal vocational guidance of the public high school is hardly ready to pick them out. So, too, there are other occupations which may well be omitted because of the peculiar personal views required and the special dangers and drawbacks which they involve for the vast majority.

The chapters on law, dentistry, engineering, the various business and manufacturing lines are exceedingly helpful.

The Slide Rule

By H. T. Erickson. Paper, 32 pages. Price, $0.32. The Bruce Publishing Co., Milwaukee, Wis.

This booklet has been prepared in response to a demand for a book laying particular stress on essential processes, multiplication and division, and the elimination of guesswork in the location of the decimal point. It presents in a clear, concise manner, the problems of the slide rule, as applied to multiplication, division, evolution and involution. The book should be of value to shop teachers and others interested in teaching the slide rule fundamentals to drafting students.

Carpenter Work—Stair Work—Mill Work.

By Geo. W. Raynor. Cloth, 76 pages, with 96 blue prints.. Compiled, written, illustrated, and published by Geo. W. Raynor, Philadelphia.

This is an introductory work for beginners and is intended to convey correct information on woods and lumber, tools and their use, elementary joinery, elementary carpentry, roofs, joint framing, stairwork, mill work. The illustrations are blue prints.

Domestic Handicraft

By M. Helen Murray. Cloth, 115 pages. Price, $1.25. Isaac Pitman & Sons, New York City.

This English work outlines practical methods for the maintenance, care, and repair of household furniture, and home equipment. The field covered is similar and in large part the same, as home mechanics, and includes much that is of interest to girls and women. Many of the terms are strange and some of the processes differ considerably from our practice.

The Child: His Nature and His Needs

By M. V. O'Shea. Cloth, 516 pages, illustrated. Published by The Children's Foundation, Valparaiso, Ind.

PUBLICATIONS RECEIVED

Civilian Vocational Rehabilitation Program in Minnesota. Monograph No. 1, March, 1925, issued by the Federal Board of Vocational Education, Washington, D. C.

Outline Course in Elementary Mechanical Drawing for Intermediate and High Schools. By E. A. Ferns. Bulletin No. 220, 1925. Issued by the State Board of Control for Vocational Education, Lansing, Mich.

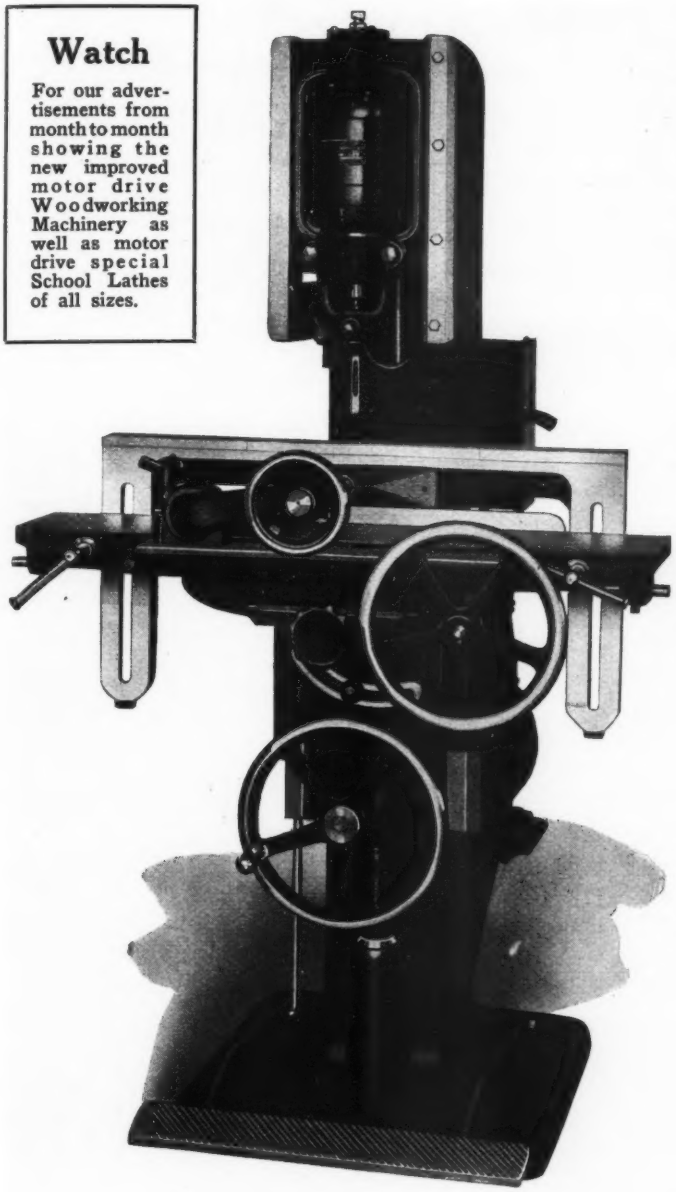
A Modern Trade School—Southbridge Vocational School, Southbridge, Mass. Outlines the requirements for admission, gives the length, the number and kind of school and shop sessions, and the nature of the shop work offered.

Unit Courses in Trades. Series x, No. 5, issued by the Kansas Teachers' College, Pittsburg, Kans.

THE BELTLESS LINE

Watch

For our advertisements from month to month showing the new improved motor drive Woodworking Machinery as well as motor drive special School Lathes of all sizes.



Showing the new Famous Full Automatic Hollow Chisel Mortiser, equipped with two one horse-power motors, one operating the ram with two changes of feeds and two changes of stroke. The other operating chisel equipped with fan and spout for clearing shaving.

Capacity of chisel ¼-in. to ¾-in. with full universal table. It is also built with Chain Mortiser in head, being driven by separate motor with suction fan for taking shavings from the chisel.

The heads are interchangeable, making it possible to have both Hollow Chisel and Chain Mortiser in one machine.

Capacity of chain, 3/16 to ½ in.

New Britain chains, sprockets and bars are used.

Ask for special bulletin on both Hollow Chisel and Chain Mortisers. Address Dept. 802.

Built in

THE FAMOUS SHOPS

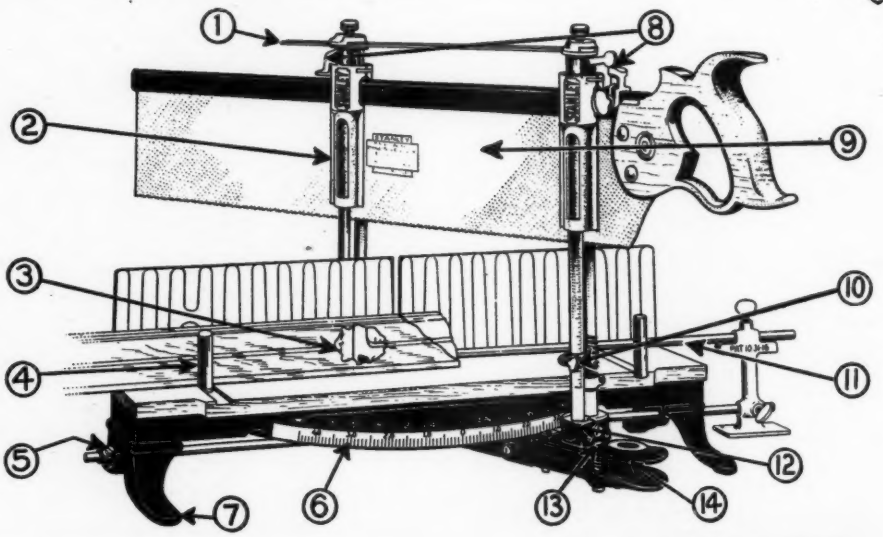
Sidney, Ohio

FAMOUS

The Sidney Machine Tool Co.

Stanley Mitre Box

STANLEY SW



Send for an explanation chart showing this Stanley Mitre Box No. 346 and its 14 outstanding features.

STANLEY
NEW BRITAIN, CONN. U.S.A.
THE STANLEY WORKS — THE STANLEY RULE & LEVEL PLANT

NEWS AND NOTES

Establish Vocational Fund. The parent-teachers' association of Claude, Tex., has established a fund to enable boys to attend vocational courses.

Domestic Science Equipment Installed. The parent-teachers' association of Wellington, Kans., has agreed to raise $500 for domestic science equipment in the local high school.

New Certificate Law. Under a bill recently passed in Texas, special teachers of industrial arts and home economics having four years of experience, are exempt from the requirements of the certificate law which requires a minimum college training for holders of these certificates.

State Clothing Contest. A state clothing contest, in which all home economics departments of Texas schools are entitled to participate, was held April 23rd to 25th, at Austin. More than 100 schools and 600 girls entered the contest. Prizes were awarded on a basis of the merit of the clothing exhibited and worn by the entries.

Home Economics Department. A home economics department has been installed in the high school at Rio Hondo, Tex. The department has been opened in a new $60,000 building recently completed.

Teach Safety. The American Museum of Safety, in cooperation with the state department of labor and the board of education of New York City, has inaugurated a campaign for the prevention of accidents to children in industry. The campaign is the result of a report from the state labor department showing that in one year 1,983 children were seriously injured at work in factories in New York. One of the first steps will be to have each pupil in the continuation schools visit the museum where almost every device for the prevention of industrial accidents is on exhibition.

Two Vocational Conferences. Two conferences for vocational teachers of Kansas will be held during the month of June. The conference of vocational agriculture and home making teachers will take place at Manhattan June 4, 5, and 6. The trade and industrial, and vocational home making conference will be held at the Kansas Agricultural College, Pittsburg, June 8, 9, 10 and 11.

Mr. L. H. Dennis, state director of vocational education in Pennsylvania, and Percy Angove, state supervisor of industrial education in Michigan, will be conference leaders, as will also Lewis H. Gustafson, of the David Ranken School of Mechanical Trades, St. Louis.

The aim of the conference is to develop and determine the best method of organizing instruction in all types of vocational education.

Vocational Courses. New courses in commercial subjects, printing, machine shop and vocational wood working have been introduced at Dubuque, Ia., in connection with a new school program.

New Vocational School. A vocational school, to cost $175,000, will be erected at El Paso, Tex. Messrs. Trost & Trost, El Paso, are the architects.

Plumbing Class. The school board of Fort Wayne, Ind., has approved a recommendation of the master plumbers providing for a plumbing class in connection with the night school. The association has agreed to supply the students and the plumbing fixtures, leaving the school board to furnish the classroom supplies and the instructor.

New Vocational Shops. The new Solvay high school at Solvay, N. Y., which will be occupied in September, will have shops for wood working, electricity, printing, sheet metal work, automotive repair, domestic arts and science.

Plumbing Class. A vocational class for plumbers' apprentices has been formed at Poughkeepsie, N. Y., to assist apprentices in their chosen trade. The course has been planned with the approval and support of the master plumbers' association.

Kansas Vocational School. The Kansas Industrial and Educational Institute, of Topeka, has changed from a college into a vocational or trade school. At the last session of the legislature, the name was changed to Kansas Vocational School, with the aim of training teachers for vocational work. The trade courses are to be materially strengthened, and much of the trade work will be aided by the Smith-Hughes law.

Northwest Iowa Teachers Meet. An inspiring round-table meeting of industrial-arts teachers was held at Sioux City, Ia., during the Northwest Teachers' meeting on April 3rd. Mr. Frederick H. Bohning, Rock Rapids, presided at the meeting and led in the discussions. A paper on "Our Present-Day Needs" was presented by L. O. Sheppard of Washta; "Some Problems of the Finishing Room" was presented by Raymond Bushgens of Little Rock; and "Shop Forms and Records" by P. B. Sharrar of Hawarden. Wm. R. Baker, president of the Iowa Association of Manual and Industrial Arts Teachers, gave a talk on "The Objectives of the Association."

American Federation of Arts Meeting. The sixteenth annual meeting of the American Federation of Arts will be held May 13th to 15th, at the Museum of Art, Cleveland, Ohio.

At the morning session of the first day of the convention, the subject for discussion will be "Our National Art Organization's Big Job"; at the afternoon session the subject will be "Fostering the Small Art Museum."

On the second day, the morning session will open with the topic, "The Future of Outdoor Advertising," taking up the case of the signboard, outdoor advertising, the changing viewpoint of the advertiser, the future of the poster, and other points of interest. In the afternoon, the subject will be "Community Art," taking up pageantry as community expression, the development of musical communities, and the library as a community art center.

In the late afternoon there will be visits to the School of Art, to the home of Mr. Ralph King, and to other notable collections. In the evening there will be an informal conference on "the place of the small theater in a community," followed by a play by the Play House Company.

Timber Conservation. The U. S. Forest Service, in connection with activities during American Forest Week, April 27th to May

(Continued on Page 26a)

The *Good* Habit of Using *Good* Tools

MILLERS FALLS TOOLS
SINCE 1868

ISN'T there a proverb about "a good workman being known by his tools"? The boys of today will be workmen tomorrow —working for their pleasure or their livelihood.

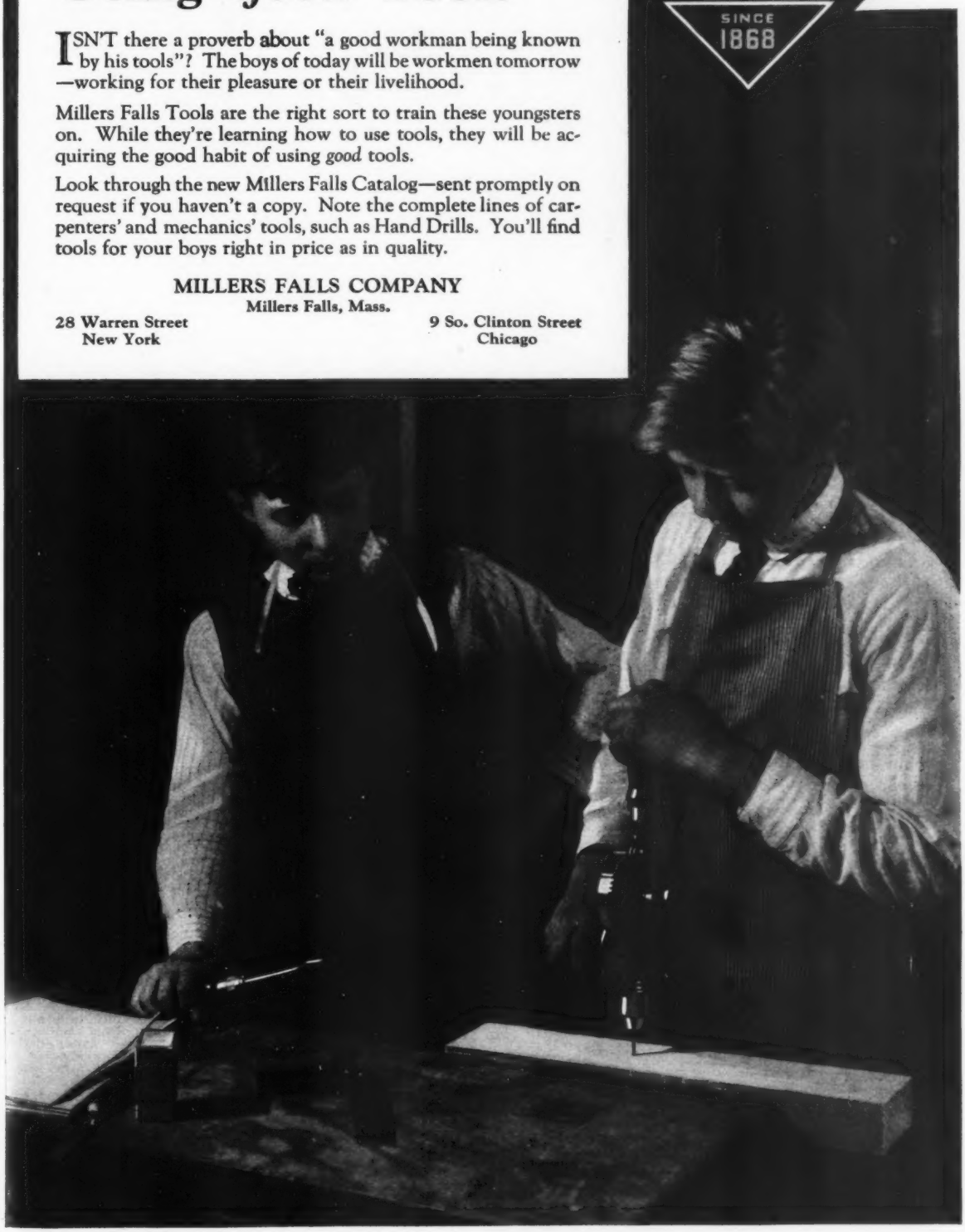
Millers Falls Tools are the right sort to train these youngsters on. While they're learning how to use tools, they will be acquiring the good habit of using *good* tools.

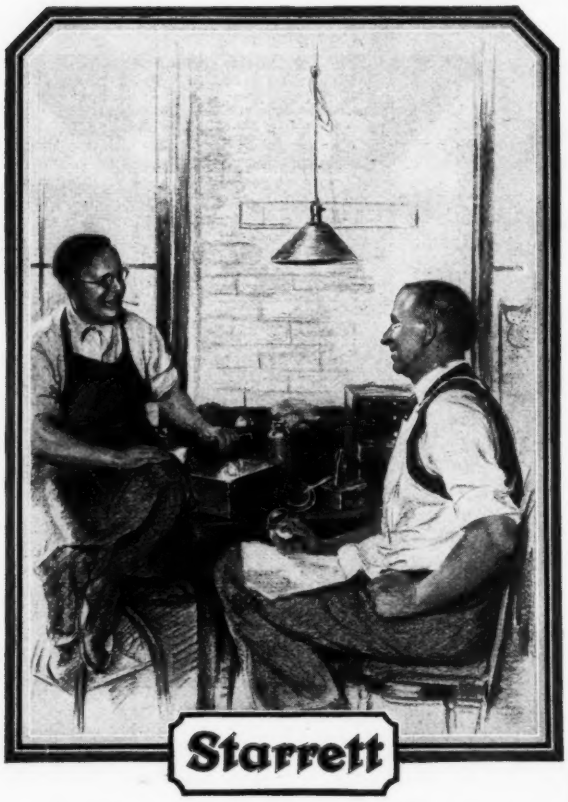
Look through the new Millers Falls Catalog—sent promptly on request if you haven't a copy. Note the complete lines of carpenters' and mechanics' tools, such as Hand Drills. You'll find tools for your boys right in price as in quality.

MILLERS FALLS COMPANY
Millers Falls, Mass.

28 Warren Street
New York

9 So. Clinton Street
Chicago





Black Enameled Frame Micrometer No. 436

A justly popular number from the Starrett Line of over 2200 Fine Precision Tools. This Micrometer has the Black Enameled Frame, Decimal Equivalents plainly marked on the thimble and is furnished with or without Ratchet Stop.

You can buy this Starrett "Mike" from any good hardware store at a very attractive price. It is accurate, well made and will give you years of reliable service. Your choice of 1, 2, 3, 4, 5 and 6-inch sizes, singly or in sets.

THE L. S. STARRETT CO.

World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes - Standard for Accuracy
ATHOL, MASS.

See pages 142-181 in the Starrett Catalog No. 23 "CE" for description of the very complete line of Outside and Inside Micrometers made by The L. S. Starrett Co. If dealer cannot supply you write us and we will send you a copy at our expense.

7781

(Continued from Page 24a)

3rd, presented as an argument for timber conservation, the example of a railroad which had reduced the area required to grow ties for tracks from 3,400 square miles to 2,600 square miles. Also, a progressive western railroad which began the extensive use of chemically treated ties in 1900, in the period from 191 to 1920 showed an average of 188 tie replacements as against 24 in previous years. In 1921 and 1923 these replacements were still further reduced to 145 per mile, a reduction of 100 ties per mile from the first eleven-year period.

Estimating the miles of track in the road in question at 18,000 and the saving at 57 ties per mile, the total number of ties saved each year will be 1,026,000. Since it requires twelve cubic feet of standing timber to produce one tie, this is equivalent to 12,312,000 cubic feet of standing timber. This amount of timber is equivalent to an annual growth on 513,000 acres or 800 square miles.

Texas Governor Vetoes Vocational Appropriations. Governor Miriam A. Ferguson of Texas vetoed in April, the entire legislative appropriation for vocational education under the Smith-Hughes law, and as a result work in home economics, vocational agriculture, trades and industries in Texas will face a "marktime" period for two years, or in some cases complete elimination. It is estimated that the home economics department will receive a fund of $16,848 from the federal government, with nothing from the state, as compared with $125,061 allowed by the state this past year, and $102,719 the previous year. The total last year from the federal government was $223,038, and $267,723 this year.

The schools affected by the reduction of funds include the following:

Ninety-nine schools doing full vocational work under the Smith-Hughes law; evening schools in the cities, as well as work carried on in home economics cottages in the small communities; 47 other home economics classes in operation in the state.

Industrial Art Competition. The Art-in-Trades Club of New York City has announced its fourth annual competition instituted to stimulate creative effort on the part of designers, decorators, architects and manufacturers in the evolution of industrial art designs native to this country.

The program includes two projects, namely, the decoration and furnishing of two rooms at a cost estimated to be within the resources of a family with a yearly budget of $6,000, and the decoration and furnishing of three rooms at a cost deemed appropriate for a family having an income of $30,000 or more.

The designs must be mailed to the Art-in-Trades Club, 34 East 38th St., New York City, not later than September 30, 1925, and the awards will be made on October 15th.

Printing Trades Continuation School. The school board of New York City has cooperated with the printing industry for the operation of a central printing trades continuation school.

Motion Picture Films. Three motion picture films relating to the mining industry have recently been announced by the General Electric Company of Schenectady, N. Y. The films are entitled Anthracite, Bituminous, and Pillars of Salt, and are intended to give educational information on industrial progress. The last mentioned film was prepared at one of the largest mines and refineries in the country and many of the scenes were taken more than one thousand feet underground.

Survey of Vocational Education. Fresno, California, has made preparations for a survey to determine its needs in respect to a program for vocational education. The advisory committee is composed of members of the state vocational department, the division of vocational education of the State University, the Fresno State Teachers' College, and the local community, including the school department, labor and the chamber of commerce. Mr. W. R. Hepner, assistant superintendent of schools, is the director of the survey and has on his staff members of the teaching force representing all phases of vocational education. The survey is to determine the real needs and to make efficient use of the resources for vocational training.

Apprenticeship in Plastering. A state-wide movement to secure the cooperation of the state and local authorities of California in the establishment of vocational schools where plastering may be taught, was inaugurated at the closing session of the Pacific Coast Conference of the Master Plasterers' Association in February.

Mr. M. S. Lewis, of the Division of Vocational Education, University of California, discussed ways of establishing apprenticeship and upgrading courses to train men in the trade to become expert workmen capable of doing ornamental work.

Course for Chefs. At the Lafayette Junior High School, Los Angeles, Calif., a course of instruction for chefs in cooking, serving and management has been conducted for the past five years, each year's graduating class numbering between thirty and forty young men. The course consists of two years of intensive instruction by a practical chef, with years of experience in the field. Most of the boys leaving the school obtain ready employment, and they are found in hotel kitchens, on dining cars, and in some cases, in places of business under their own management. The work covers every phase of restaurant cooking from soup to pastry; also all baking, including bread, cakes and pies in regular cafe type ovens. Special attention is also given to methods of serving in which one of the prime factors is sanitation.

Build Shop. A "home and community occupational shop" has been completed by the shop classes at Stockton, Calif., in response to a demand for additional space for the grade school shop work.

Plans were drawn for a shop large enough to house all the home and community occupations and the board was asked to supply the amount necessary to build. The concrete forms were put in by the high school carpentry boys, while the doors, windows, frames, sash, lockers, and drawing cabinets were made by the high school boys in cabinet-making. The electrical wiring, both power and lighting circuits, were installed by the prevocational electrical class. The plumbing was installed by prevocational boys, working under the direction of a master plumber furnished by the local plumbers' association. Boys taking sheet metal work in the prevocational school made and installed all the water gutters and placed all the metal flashing on the building.

The building is supplied with equipment, part of which was made by the high school boys in the vocational department. The drawing tables, boards and science equipment were built by the cabinet-making class. Six speed lathes, including six clutches to

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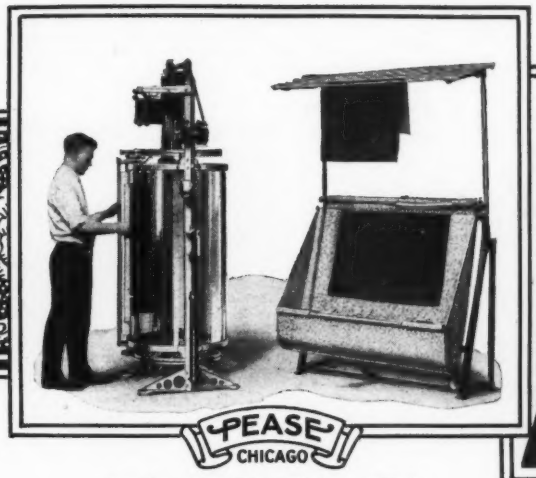
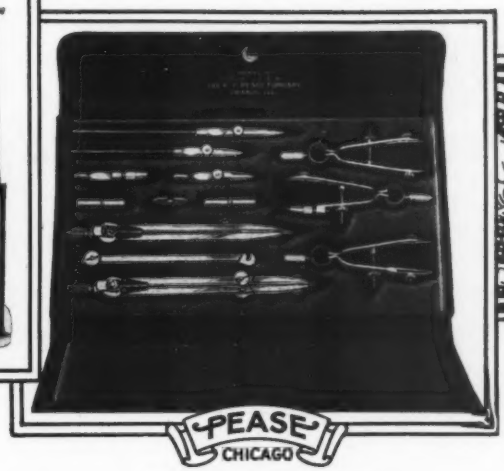


Pease Vertical Blue Printing Machine and Washing Machine specially designed for school use.



Pease Franklin Drawing Instrument set No. 666—will last a lifetime.

When You Specify Pease School Supplies You Get Quality at a Moderate Price

Pease School Engineering Supplies are manufactured with the one purpose of giving the student more value for the money than he can purchase elsewhere. Our line is complete and includes the regular Pease American Made Drawing Instruments, Instructors' and Students' Tables, Filing Cabinets, T-squares, Triangles, Slide Rules, etc., as well as the incomparable Pease line of Blue Printing Machinery. We have also added to our line of American manufactured drawing instruments, a complete line of George Schoenner German Instruments. In obtaining these imported instruments, we are enabled to offer a line of more moderate priced instruments, which we have been unable to manufacture in America on account of the high labor cost.

This Special School Blue Printing Equipment

as illustrated above is equipped with our Pease Universal High Power Arc Lamp and will make two blue prints or negative prints 32 x 42" or smaller. Larger machines will be furnished at small additional expense if required.

The Washing Machine is furnished with two small trays and brushes as indicated at the foot of the machine. These trays are used for holding chemicals for intensifying blue prints or fixing negative prints. This combination has proved exceptionally fine for making blue prints and negative prints and has been installed by educational institutions all over the United States.

The Blue Printing Machine will be furnished separately from the washing machine if desired, although we recommend that the entire equipment be purchased. Printed instructions for making blue prints and negative prints are sent with each machine. **Ask for our pamphlet "Instructions for Making Blue Prints," and details of our special school offer on this equipment.**

Pease Drawing Instruments Just Suit Student Use

They are manufactured to specifications which are the result of actual investigation as to the features required for the use of students. They are precise to the nth degree, have that nicety of balance only contained in high quality instruments and are manufactured of high grade material.

Modern factory methods have enabled us to revise our prices on all Pease American Made Drawing Instruments and we are offering them at a substantial reduction. In fact these instruments as well as the imported line are very attractively priced and easily within reach of the average student.

We have just printed a new catalog of Pease Drawing Instruments, showing our complete line of American Made Instruments which are manufactured right here in our Chicago Factory and also our George Schoenner Instruments which are priced lower, but are of the finest quality. They are especially recommended where a moderate priced instrument is desired. **Just ask for Catalog D-02.**

SIMPLY FILL IN THE COUPON

The C. F. Pease Company

802 North Franklin St., Chicago

The C. F. Pease Company,
802 N. Franklin St., Chicago.
Gentlemen:
Please send to my address special catalog and information checked below for which I am under no obligation.

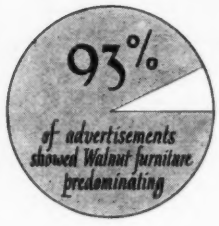
- ☐ Blue Printing Machinery.
- ☐ Blue Print Paper and Supplies.
- ☐ Drafting Room Supplies for the School.
- ☐ Drawing Instruments.
- ☐ School Drafting Room Furniture.

Name.....
Position.....
Street No.....
City and State.....

What 1532 furniture advertisements *proved*

Here are the results of a careful investigation of furniture advertising all over the country—

FEBRUARY, with its universal furniture sales, is a good time to study the conditions of the trade. So last February a thorough canvass was made. 1532 retail advertisements were collected from all sources, from large cities and small towns, from all classes of newspapers appealing to the highest trade and the cheapest buyers. After deducting ads which offered only kitchen equipment, upholstered, wicker or painted furniture, etc., there remained more than 1000 advertisements of wood furniture. An analysis of these advertisements showed that

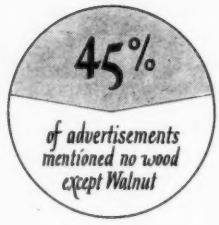


97% advertised and featured walnut furniture.

93% of the advertisements had walnut furniture as the dominating feature.

45% of the advertisements featured walnut furniture *exclusively.*

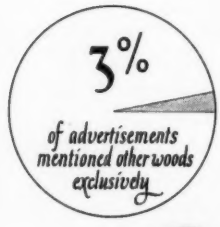
3% of the ads featured other woods exclusively.



These findings represent the universal sentiment for walnut furniture, as the advertisements represented a thorough cross section of the whole country.

Note these figures: 97% featured walnut; in 93% walnut predominated; 45% mentioned no wood except walnut, and only 3% mentioned other woods exclusively.

Isn't this convincing PROOF of the dominant demand for walnut? The dealer gives the public what it wants. 97% of the ads featured walnut. Isn't that an indication that walnut enjoys a 97% preference?



Demand for Walnut Is Overwhelming

The demand for walnut is enormous and growing all the time.

The manufacturer who will supply simple, unornamented ***genuine*** walnut exterior sets, and the dealer who offers them for sale, will reap a harvest.

AMERICAN WALNUT

"THIS IS THE WALNUT AGE"

AMERICAN WALNUT MANUFACTURERS' ASSOCIATION

Room 1219, 616 South Michigan Avenue **Chicago, Illinois**

(Continued from Page 26a)

be used on the line shaft, a drill press, a grinder and a few metal working tools were made by the boys in the machine shop.

Vocational Teachers Form Alumni. The Vocational Teachers' Alumni Association of the University of California, Berkeley, has closed a most successful year, with a membership well over two hundred members. The association was organized in 1922 by the first graduating class from the teacher-training group, with nineteen charter members. The association is doing a good work in interpreting vocational education to persons more or less skeptical about it, and its members keep posted on what is being done in other schools. Mr. Elmer C. Richardson is president.

Shoe Repairing as Prevocational Work. At San Diego, Calif., three attempts at shoe repairing have been made in the city schools. The third and newest shop was opened at the Memorial Junior High School, under the direction of Paul E. Klein, head of the industrial arts department, and a former shoemaker.

It was planned that this should be an attempt on a real scale to try out shoe repairing as a regular shop subject. Not only was complete equipment for a class of twelve provided, but a sewing machine and a motor-driven finishing outfit was installed.

Emphasis in the shop was placed on doing real work in a workmanlike manner. No cobbling was allowed, but each pair of shoes was repaired and resoled with attention as to the type of construction it represented. Emphasis was also placed upon various qualities and kinds of leathers, and the methods of recognizing kinds and qualities. The shop has repaired over three hundred pairs of shoes, in addition to sewing and other small jobs.

The success of the work and the interest aroused caused the supervisor, Mr. P. H. Heron, to suggest that shop teachers take a short intensive course of training in this trade. As a result, a class of ten teachers met weekly at the Memorial Junior High School for a ten weeks' course.

While the major portion of the work is performed at the bench actually on the job, notebooks are kept by the men in which instructional material may be placed, as well as notes upon explanations and a list of work accomplished. The instructional material includes four types of shoe construction, leathers used, resoling, waxes, rips and patches, together with an analysis of the trade, and a study of equipment, supplies and methods of instruction.

Study Industry by Observation. The machine shop students of the high school at San Jose, Calif., have as a part of their course, class excursions to the leading manufacturing plants and commercial centers to give a concrete knowledge of the industrial and commercial world. The aims of the trips are to give the pupils a closer connection between their school studies and the world of industry; to awaken the dormant powers of the pupils, and aid them in discharging that work for which they are adapted; to aid the pupils in realizing the value of unskilled, half-skilled, and skilled labor in the industrial and commercial world and thus enable them to recognize the importance of thorough preparation in their chosen field of labor.

Through the excursions the boys grasp some idea of the relationship of the agricultural, industrial, and commercial world. They realize the value of invention in the progress of civilization, the relationship between labor-saving devices and competition, and the value of the organization of labor and capital.

Following these visits, the pupils are required to write compositions on the results of the trip to find out how much knowledge they have assimilated. The composition work is connected with the regular lesson in English and offers a splendid opportunity to make outlines of the subject and to express their ideas in written form.

Justification of Trade Training. Continued indifference to the acute needs of industry, and the community, for trained manpower of sufficient quantity and quality is being felt now and will be felt more in the future, according to a recent statement of the Illinois Educational Press Bulletin. Its effect will be widespread and embarrassing in the production of the necessities and luxuries of the present day. Men of average means are experiencing increasing difficulty in building and paying for homes to shelter their families because of the excessive cost of materials and labor. Corporations and smaller business interests learn about the costs of building and find that there is a relation between building cost and the supply of labor.

As a result of this widespread need there are a number of people interested in training for production not only in the building trades but in the manufacturing trades as well. To give a real picture of the situation, a table has been compiled, showing the number of building trades craftsmen in different age groups, together with the number of apprentices who must be depended upon to take the places of the workers who drop out of the trade through old age or other causes.

Trades	Ages 20 to 24	Ages 25 to 44	Ages 45 to 64	65 and over	No. of Appr.
Carpenters	59,207	412,704	333,120	65,444	4,805
Cabinet makers....	3,286	21,250	16,277	3,765	1,020
Electricians	47,585	127,318	22,887	1,114	9,562
Masons	7,760	62,714	49,252	10,024	1,434
Painters	24,058	164,170	107,851	16,973	1,616
Paperhangers	1,071	9,573	6,816	991	172
Plasterers	2,626	24,199	15,804	2,688	398
Plumbers	30,636	124,080	42,214	2,654	7,386
Roofers	1,163	6,253	3,236	417	250
Structural iron.....	2 269	12,151	3,842	154	.....
Sheet metal.....	9,293	40,535	19,412	3,040	2,861
Blacksmiths	18,606	109,342	75,180	13,980	2,661
Machinists	163,497	506,631	164,088	16,035	39,463
Molders	12,796	77,642	28,479	1,958	.....
Pattern makers....	3,992	13,984	7,109	1,322	.....
Printing trades....	29,815	98,929	41,720	4,131	.....

It is interesting to note the relative numbers in the different age groups and to consider the insufficient number of apprentices to take the places of workmen of 65 and over. Among other things noted, is the large increase in the number of plumbers in the last 25 or 30 years. This is accounted for in part by the growing use of gas, piped water, and the increasing popularity of the bath tub. The expansion in the electrical trades, due to recent inventions and to a higher general wage level, accounts for the large number of electricians found in the first two age groups.

(Continued on Page 31a)

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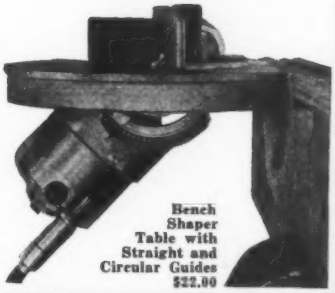


Bench Shaper Table with Straight and Circular Guides $22.00

(Continued from Page 28a)

The expansion which has taken place in the structural iron, plumbing, sheet metal and machine trades has attracted workers who might otherwise have gone into the older trades that are in need of recruits, such as carpenters, masons and plasterers. It is likely that all the trades will be seriously embarrassed by the dearth of trained workers and the lack of training for those being inducted into the industrial occupations, unless the public schools of the several communities accept the responsibility of helping to meet the growing need for trained workers in the trades.

College to Conduct High School Courses. Instructors and students of the College of Industrial Arts will next year have charge of the home economics departments in the junior and senior high schools of Denton, Tex., under an agreement entered into by the college authorities and the local board of education. Under the plan, one of the high school instructors will be retained as head of the department. The change in this department will effect a saving of from $3,000 to $5,000 per year and will permit the employment of additional teachers in other departments.

Pacific Arts Conference. Art for practical purposes was the theme of the conference called jointly by the California board of education and the Pacific Arts Association, on March 26th in the Palace of the Legion of Honor at San Francisco. The conference was opened with an address of welcome by Supt. J. M. Gwinn of San Francisco. Other speakers were Miss Julia Hahn, San Francisco; Miss May Goarhart, Los Angeles, and Arthur B. Clark of Stanford. All phases of art work were discussed, including etching, jewelry and metal work, posters and woven textiles.

Exhibit of Vocational Work. An interesting exhibit of vocational work done in the Murray vocational night school of Charleston, S. C., was displayed recently in the windows of a local department store. The exhibit included a complete mechanical drawing set, textbooks used in the night school, tools and machinery made by those taking the courses, show cards, free-hand drawings and other items of interest to those in the trades.

Instruction is offered at the Murray school in various subjects, including mechanical drawing, machine shop practice, show card writing, automotive engineering, electrical automotive engineering, machine shop mathematics, automobile repair and similar subjects.

New Vocational School. The extension of courses for the girls' vocational school, and the erection of a new building for the school, have been proposed at Newark, N. J.

To Recognize Art Study. An interstate drive has been begun in California to place art on an equal basis in schools, high schools and colleges, with the regular academic subjects. The idea had its inception following the art conferences held in conjunction with the school art exhibits in San Francisco. In this exhibit seven colleges and practically all elementary and high schools were represented. The display filled four galleries of the Honor Palace and ranged from hand-wrought jewelry, drawings and batik to sculpture and weaving.

New Vocational School. Plans have been prepared for the erection of the Frank Wiggins School of Trades at Los Angeles, Calif., to be erected at an estimated cost of $1,500,000. The site to be selected for the building will be easily accessible to the downtown section of the city.

Practical Work for Pupils. Pupils in the vocational classes at Pottstown, Pa., have received instruction in the making of cane seats for chairs. Orders are taken from residents for the repair of worn-out chairs.

Gift of Vocational School. A gift of $75,000 by Mrs. Henry W. Brewster for the erection of a modern vocational school at Tampa, Fla., has been announced by the director of vocational education. The school is to serve as a memorial to Mrs. Brewster's late husband and will house the opportunity school and its branches now housed in school and club buildings of the city.

The new school will house more than 1,200 students in its several departments and will provide facilities for classes in plumbing, carpentry, brick-laying, machine work, automobile mechanics, printing, mechanical drawing, millinery, dressmaking, home economics, commercial subjects, and household arts.

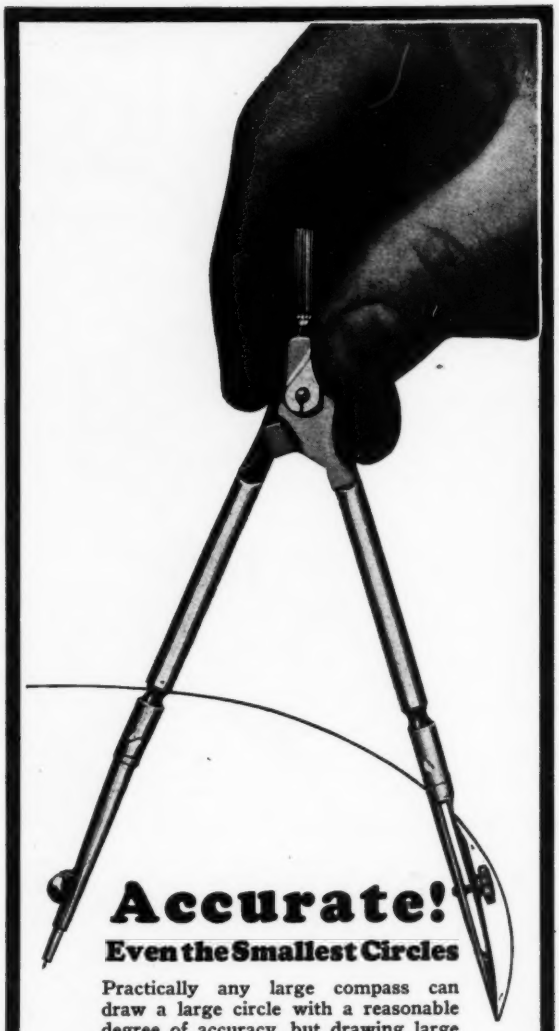
Employers Pay for Teaching Apprentices. An official of the Master Steamfitters' Association of Chicago, speaking recently, declared that employers of 360 steamfitter apprentices pay $55,000 a year for attendance of these apprentices in the Washburne Continuation School. Similarly, carpenter contractors and builders pay their 480 apprentices $90,000 for attendance at this school; electrical contractors pay their 650 apprentices $115,000 for attending the same school, and employing machinists pay their 127 apprentices $17,000 for their attendance.

There are in the Washburne school 600 boys from 14 to 17 years old, receiving practically $60,000 from their employers for eight hours' instruction per week during the year. In addition to the apprentices and juvenile workers, there are 50 ex-service men whom the federal government pays more than $50,000 compensation for the year's attendance at school, together with $15,000 paid the board of education per year as tuition.

The Washburne school is the best and largest type of public apprentice school in the country. The school is conducted by the Chicago board of education and the instructors are men of practical experience in the shop or trade which they teach. The shop activities include carpentry, machine shop practice, sheet metal work, electrical work, pattern making, steamfitting, baking, printing, boot and shoe repair, mechanical drawing and wall-paper hanging. At the present time there are nearly 500 carpenter apprentices in the school, these being classified as outside carpenters, mill workers and stage property men.

New Vocational Courses. Classes in teacher-training and foremanship training have been organized at Mansfield, O., under the direction of Prof. R. W. Kent, of the Ohio State University, Columbus.

Diplomas Given to Apprentices. A technical high school in Cleveland recently presented diplomas to a class of 150 apprentices representing the trades of plumbing, brick-laying and carpentry. All of the young men had learned their trades in school, completing the course of apprenticeship in classes maintained by the board of education in cooperation with the local building trades employers' association and the labor organizations.



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Matthew Woll, vice-president of the American Federation of Labor, speaking before the assembled audience, said: "Apprenticeship is not dead. It is being applied and revived in modern terms. Labor is happy to cooperate with the American school system which it helped to nourish. In it we find the solution of the masses and the solution of many of our pressing problems."

Trade School for Southwest. Under the leadership of the representatives of big business, a trade school for the southwest has been established at Dallas, Tex., where boys may learn practically any skilled trade. Courses have been outlined for such trades as printing, brick-laying, plastering, machine shop work, sheet metal work, carpentry and cabinet making.

Large Sum Contributed to Industrial Art School. The sum of $275,000 has been contributed to date for the founding of an industrial art school in the Chicago Art Institute, according to an announcement of the directors of the Art Institute and the Association of Arts and Industries.

The Association of Arts and Industries will establish the school, administer the funds, and the Art Institute will provide space for it. The school has been established to train men and women for industries in which design is a factor, such as furniture, printing, textiles, wall-paper, interior decoration, advertising, ceramics and toy making.

Gift to Louisville School. An additional gift of $100,000 toward a modern trade school, to be erected at Louisville, Ky., has been announced. The donor, Theodore Ahrens, previously had given $150,000 toward such a school.

Vocational Bureau. A department of vocational counseling has been established at St. Louis, Mo., in order that school children may have expert advice when they plan to prepare for their life work. The bureau is headed by Everett A. Hidey, formerly instructor in vocations at the Cleveland High School, and will have two assistants, Mr. G. H. Hargitt, of the Central High School, and Miss Alma Fletcher, a former instructor at the Jefferson continuation school.

The bureau officials plan to conduct a survey of the St. Louis industries in order to offer the most reliable information to pupils whom they will assist. Another survey of boys and girls available for different kinds of positions will be made in order to place pupils in positions for which they are best qualified. Although placement will be a part of the bureau's work, the most important feature will be the counseling work for pupils about to choose their life work.

More than 1,700 of the 2,700 night students at the Carnegie Institute of Technology are taking courses in building and machinery trades. The Improvement Bulletin says: "The growth in night student enrollment in these trade courses, which is this year about 100 per cent over that of three years ago, gives further evidence, the report suggests, that young men are more and more appreciating the opportunities to win success by the 'overall route' rather than through the 'white collar' jobs. Although a majority of the night students enrolled in the trade courses are regularly employed in trades directly or indirectly related to their night studies, attention is called to the fact that a surprisingly large proportion of the students are filling 'white collar' jobs in the day time. Many of these are working as draftsmen, tracers, clerks, or timekeepers and are taking trade courses, the report points out, either to shift later to work as tradesmen or to familiarise themselves with more skill in craftsmanship in order to progress faster up the ladder of industrial success."

Ninety Thousand in Part-Time Schools. Ninety thousand boys and girls between 14 and 17 years of age are enrolled in part-time schools in New York State, according to a recent report by Lewis A. Wilson, state director of vocational and extension education. Under the law, children between 14 and 18 not attending full-time day schools must attend part-time schools where these schools are established. There are 655 000 boys and girls between these ages in the state and 282,000 are outside the full-time schools.

Activities of Pennsylvania Society for Vocational Education. The P. S. V. E. has a definite program for this year's activities. It will conduct two meetings, one at the State College this summer, and the other in connection with the P. S. E. A. in Scranton in December. The Society has conducted a campaign of publicity for legislation favorable to the development of vocational education. It has sponsored several bills in the state legislature tending to further promote this type of education and is interested in national projects for the further promtion of this type of education.

Erie Meeting of the P. S. V. E. The Pennsylvania State Vocational Education Association held its annual banquet and business session at Erie during the P. S. E. A. convention. Mr. L. H. Dennis served as toastmaster. The two speakers on this occasion were Mrs. Anna L. Burdick of the Federal Board for Vocational Education, and Mr. Frank M. Leavitt, associate superintendent of schools, Pittsburgh. Mrs. Beula Manley, president of the society, presided at the business session.

Annual Vocational Conference. The annual Pennsylvania state conference will be held August 10th, 11th and 12th at State College, Pa. There are two general sessions and three sectional meetings. In the industrial section, it is planned to devote one session to the particular classroom problems of the groups representing the teachers in the general shop, in wood-working, pattern-making, drafting, machine shop, sheet metal, plumbing, printing, auto-mechanics, trowel trades, related studies and evening trade extension work.

The state will reimburse the school district again for one-half the traveling expenses of each person in the fields of agriculture, continuation school, home economics and industrial education. The local district will be asked to finance the other half of the traveling expenses.

New Vocational Legislation. Among the educational bills passed by the Pennsylvania legislature are two bills pertaining directly to the future development of vocational education. One of the bills provides aid toward the salaries of vocational teachers. A second bill provides special vocational reimbursement to school districts. The percentage of vocational aid, in addition to the general aid, varies from 25 to 55 of the actual salaries. The splendid cooperation and the effect of the provisions of this new legislation are expected to have a far-reaching effect in further promoting vocational education within the state.

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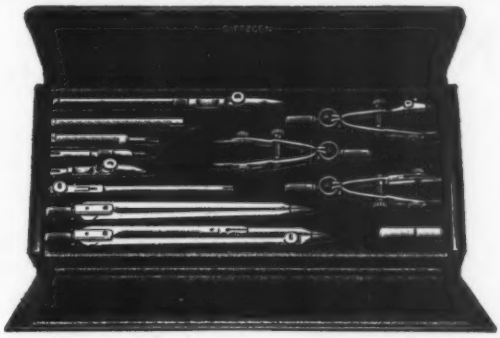

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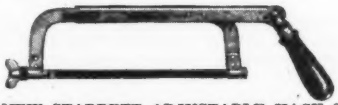
For the SCHOOL BUYER

BUYERS' NEWS

Starrett Offers New Tools. In response to a demand from the motor repair trade and the machine tool construction field, the L. S. Starrett Company, of Athol, Mass., has just issued a new feeler gauge, having eight leaves in the thicknesses of .002, .003, .004, .006, .010 and .015. The leaves are of one-half inch width and nine inches long and may be easily replaced when broken.



THE NEW STARRETT ADJUSTABLE HACK SAW.

Another tool marketed by the Starrett Company is intended for the use of automobile repairmen, plumbers, steamfitters, electricians or other mechanics whose work calls for the use of a hand hacksaw in cramped quarters or strained positions. The hacksaw frame will take any length blade from eight to twelve inches and has a handle which may be adjusted to no less than thirteen positive locking positions to suit different working conditions.

Setting Cross-word Puzzles in Type. The American Type Founders Co., Jersey City, N. J., has issued a small booklet showing type sizes and methods of arrangement for the setting of cross-word puzzles. Cross-word puzzle fonts are furnished in three sizes, i. e., 24, 18 and 12-point. The characters are accurately cast in type molds and the fonts of each size are ample to take care of the average puzzle.

Catalog of Keuffel & Esser Company. Thirty-sixth Edition. Cloth, 482 pages. Issued by the Keuffel & Esser Co., New York City, and Hoboken, N. J. This book represents the latest and most complete edition of the catalog of supplies issued by this firm. The fact that it is in its 36th edition speaks for the past record of the company and the service which its catalog renders to the school field. It is a complete list of supplies ranging from drawing papers and materials to a varied assortment of mathematical and scientific instruments comprising slide rules, calculating instruments, surveying instruments, builders' transits and levels, architects' and engineers' instruments, plane tables, sextants, surveying and prismatic compasses, hand levels, barometers, and anemometers. Each item listed is illustrated and accurately described for the benefit of the user. A very complete index is found in the back of the book for more quickly locating items desired.

In addition to this catalog, the firm also issues a trade price list of instruments for schools and trade grades of drawing tools, also a price list of measuring tapes for the hardware trade.

New Disston Plant in Chicago. Henry Disston & Sons, Inc., manufacturers of saws, tools, files, knives and steel, has purchased a more commodious building at 111-115 North Jefferson Street.

The present facilities were secured in response to a demand for larger manufacturing and storage facilities in the Chicago district. The new factory is equipped to give more efficient and more rapid service to mill-saw users in the territory. New and repair work will be handled in record time on mill saws, both solid and inserted-tooth types, band saws, cross-cut saws, machines, and saw tools.

It is announced that the educational department in the factory at Philadelphia will continue to serve the school interests of the country.

Prang School Buyers' Guide is a most helpful booklet issued by the Prang Company of Chicago, for the use of the school authorities. The pamphlet describes and illustrates the various Prang products, among which are school papers, mounting boards, weaving papers, water colors, temperine, gold and silver paints, crayons, chalk crayons, water colors, art brushes, drawing compasses, enamelac, ivorene sheets and novelties, dekko boards, arts and crafts beads, permodello, reliefo, stixit paste, bateeko

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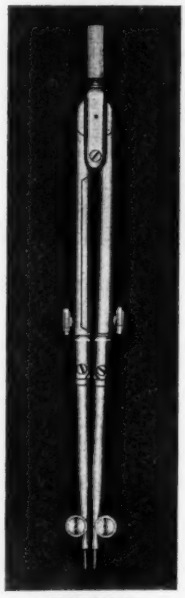

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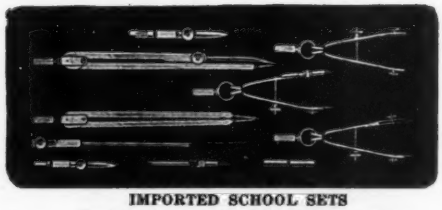

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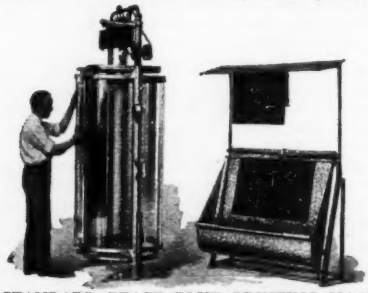
The opening pages of the booklet contain the story of the development of water colors and their use in the schools, and the part the Prang Company has played in this progress of art work during its 69 years of service.

A price list of the Prang products is included with each booklet, and copies of both will be sent to instructors and supervisors of art and drawing on request.

School Blue Printing Equipment. The blue printing equipment, as illustrated herewith, is especially constructed for use by educational institutions. It is moderately priced and is the ideal equipment for schools, inasmuch as it is thoroughly modern in every respect and turns out a steady supply of blue prints.

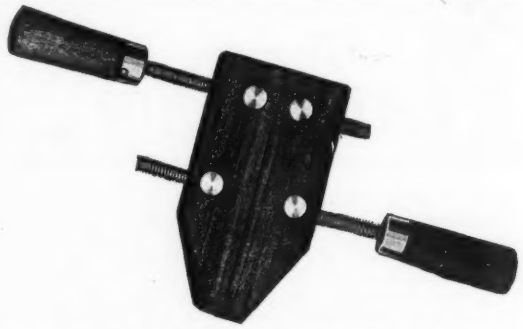
Thus the students may not only be instructed in the most up-to-date method of making blue prints, but the



THE STANDARD PEASE BLUE PRINTING MACHINE WHICH IS WIDELY USED IN SCHOOLS.

school can also operate a commercial blue print plant and thus earn an extra revenue.

Complete catalog illustrating and describing this equipment can be obtained by writing to The C. F. Pease Company, 802 North Franklin Street, Chicago, Illinois.



THE NEW JORGENSEN "BABY" HAND CLAMP.

New Jorgensen Baby Clamp. The Adjustable Clamp Company has just issued complete circular matter describing the new Jorgensen "Baby" hand screw, which is of particular interest to wood-working teachers. The clamp has all the advantages of high grade materials and accurate workmanship of the standard models of Jorgensen hand screws, and is especially adaptable to small school work. It has jaws only four inches long and takes work up to two inches thick. It is ideal for use in the home tool kit.

State Aid to Trade School. The sum of $49,355 will be appropriated by the state department of Massachusetts as reimbursement to the city of New Bedford for the maintenance of state-aided vocational and continuation schools.

New Vocational Courses. The first steps have been taken toward the establishment of an enlarged course of vocational training at Hutchinson, Kans. Among the courses planned for the junior and senior high schools are printing, automobile mechanics, architectural drawing, commercial art, cabinet-making, electricity, radio and sheet metal work.

County Trade School on New Basis. Among the changes inaugurated by the county board of Essex County, New Jersey, is the reduction of the school year for the boys' vocational school from twelve to eleven months. Other changes are the adoption of a uniform length of day for vocational and continuation schools, and a rule that no pupil under 14 years be admitted to a vocational school unless he is graduated from the highest grammar grade.

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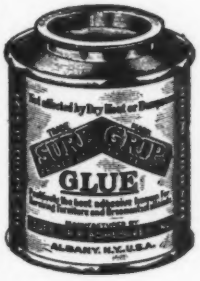

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Summer School Directory

The Stout Institute

SUMMER SESSION

Nine weeks—June 22, 1925-Aug. 21, 1925

Courses leading to Certificates, Diplomas, Degrees

HOUSEHOLD ARTS
and
INDUSTRIAL ARTS

There will be offered courses of

I	Vocational and Part-Time Group	16
II	Industrial and Trade Education Group	40
III	Home Economics Group	38
IV	Academic and Science Group	29
V	Physical Education and Coaching Group	4

The Stout Institute was the first school in America to specialize exclusively in the preparation of teachers in Household and Industrial Arts, and in Part-Time and Vocational Education.

The Stout Institute has been designated by the State Board of Vocational Education, and has been approved by the Federal Board for Vocational Education, as the teacher training institution for Part-Time and Vocational Education for Wisconsin.

Excellent Summer Recreation Activities. Low living costs.

For Summer Session Announcement and detailed information address

Director, Summer Session,
The Stout Institute,
Menomonie, Wisconsin

BRADLEY INSTITUTE

SUMMER SESSION 1925

First Term — June 15-July 18
Second Term—July 20-August 22

The 22nd Annual Session will afford the usual oportunities to Supervisors, Teachers and students in the fields of Manual Arts, Vocational Education, Home Economics, Athletic Coaching and General Education.

The following departments will offer courses:

Automobile	Jewelry
Chemistry	Mathematics
Drafting	Metalworking
Education	Music
Electricity	Physical Education
English	Speech
History	Woodworking
Home Economics	

Summer Session credits may be applied toward certificate, A.B. or B.S. degrees.

Catalog and detailed information sent upon request.

Director, Summer Session

Bradley Polytechnic Institute
Peoria, Ill.

The Penn State Summer Session

June 29th to August 7th, 1925

Unusual offerings in

Fine and Industrial Arts

Home Economics and

Vocational Education

Nearly 250 courses in all.
Collegiate and Educational Departments.
For complete catalog address

Will Grant Chambers, Dean
State College, Pa.

PERSONAL NEWS

Mr. C. Valentine Kirby, director of art education of the Pennsylvania Department of Education, will be one of the instructors at the summer session of the Carnegie Institute of Technology in Pittsburgh this year.

Mr. Herbert Heilig has been reappointed as director of the Appleton vocational school at Appleton, Wis.

Mr. M. E. Wakefield has been reappointed to his former position as manual training instructor at Butte, Mont.

Mr. Charles E. Richards, supervisor of manual training in the high school at New Albany, Ind., died suddenly on April 1st, following an attack of heart disease. Mr. Richards was formerly a principal of one of the grade schools and had filled his position in the high school for the past nine years.

Mr. W. S. Ford, formerly at the vocational school, Appleton, Wis., is pursuing a professional course at Columbia University.

Miss Evelyn Braats, of Stevens Point, Wis., has accepted a position as head of the home economics department at the vocational school, Wausau, Wis.

The Oklahoma state department of vocational education elected E. B. Nelms, of Collinsville, as state supervisor of agricultural education. Mr. Nelms served at one time as superintendent of Fillman County. In recent years he has been instructor of agriculture.

Mr. C. E. Rotruck has been appointed as instructor in vocational cooperation in the high school, Anderson, Ind.

Mr. Leonard H. Wahlstrom, who was for some years connected with the rehabilitation division of the Federal Board for Vocational Education, has returned to school work. He has resumed his former position of director of shop work at the Francis Parker School, Chicago.

Mr. Claude M. Andrews has been appointed as assistant supervisor of vocational rehabilitation for the state of North Carolina. Mr. Andrews has been assigned to work in the eastern half of the state.

Mr. Tomlinson has been appointed principal of the vocational school at Huron, Mich., to succeed J. H. McKenzie, who will give his entire time to the junior college.

Mr. R. W. Heim, Vocational Director of Delaware, has been elected to the executive board of the National Association of State Directors of Vocational Education. The other officers elected were Mr. Peterson, South Carolina; Mr. Fulmer, Nebraska, and Mr. Ricciardi of California.

Mr. Edgar Winters has been elected head of the industrial arts department at Beverly, Mass. **Miss Mary Leonard** has been made head of the household arts department.

Brass Industry Film. Prior to the opening of the convention of the State Association of Master Plumbers, the American Brass Company gave two private exhibitions of a five-reel film entitled "From Mine to Consumer." The film showed the getting out of copper ore below the earth's surface and the various stages through which the ore passes. Some of the processes are century-old while others were shown in contrast. Testing laboratories were also shown.